# The Role of Sensory Attributes and Information on the Willingness to Pay for Organic Wheat Bread

by

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# ABSTRACT

Currently, there is no published research comparing consumer demands for organic and conventional wheat grain grown in Canada when baked as bread. There is also limited research on linking the effects of information about organic production along with information on sensory experience to Canadian consumers' willingness to pay (WTP) and perceptions of organically produced products. This study uses a contingent valuation questionnaire with a sensory evaluation instrument to estimate consumer WTP for breads baked from organic and conventionally produced wheat and assesses the impacts of sensory liking and information about organic production, with a focus on the role of health and environmental information on WTP estimates. This study finds consumers' WTP increases in the presence of environment information and under the combined presence of sensory experience along with the information types. This research identifies factors that increase consumers' WTP in order to devise marketing techniques that facilitate the product's growth.

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# CHAPTER 1: INTRODUCTION

## *1.0 Introduction*

Demand for organic foods has experienced double digit growth since the 1990's in the United States, Europe and other areas (Thompson, 1998) and the worldwide retail sales of organic products have recently been estimated to be US $29-31 billion (National Statistics (DEFRA), 2003). The Census of Agriculture in Canada in 2001 reported a 20% growth in retail sales for the organic farming sector over the past ten years, despite its relatively small size (Drouin, 2003). Canada is one of the top five producers of organic grains and oilseeds in the world and the estimated retail value including processed and non-processed organic food products stood at $1.3 billion for the year 2003 (Martin, 2003) and is expected to be around $3.1 billion in 2005 (i.e.) a 20% annual retail growth that helps to sustain the organic industry's target goal of 10% of the total retail value by 2010 (Drouin, 2003).

Many studies claim that organic production methods have environmental and health related benefits over conventional farming methods (Pedersen, 2003). In support of this claim, Smith (1993) reports that organically grown foods on average had higher contents of calcium, chromium, iron, magnesium, molybdenum, phosphorus, potassium and zinc. Smith further states that organic foods averaged 29% lower mercury contents than conventionally raised foods. Crinnon (1995) and others also claim that organically grown products are richer in nutrients than non-organic products. This information suggests that organically produced foods are healthier than foods grown through conventional practices. Additionally there have been very few studies that support

the claim that organic foods taste better than conventional (Bonti-Ankomah *et al.*, 2006; Torjusen *et al.*, 2004). For example, two different surveys conducted in U.K and Wales report that only 43% of the consumers express that the relatively better taste of organic foods increased their purchasing behaviour of organic foods (Torjusen *et al.*, 2004).

The 1994-95 Canadian National Population Health Survey (NPHS) revealed that 46% of Canadians of all ages claimed that they had excellent or very good eating habits (Health Canada, 1997). These claims of healthy eating habits implicitly assume that Canadians consume foods that are rich in nutrients necessary for growth and development and thereby reduce risks of nutrition related problems. A survey conducted by Pollara on behalf of Sharp Electronics Canada Ltd. report that the majority of the surveyed population are environmentally conscious (Petrycki *et al.*, 2005), but no concrete empirical evidence exists to support the claim that pro-environmental attitudes or beliefs have a significant impact on the demand for organic foods in Canada (Bonti-Ankomah *et al.*, 2006; James, 1999).

Given recent concerns regarding health and nutrition in Canada (Health Canada 1997; Bonti-Ankomah *et al.*, 2006), it would be of interest to know how consumers perceive the role of organically grown food products in meeting these concerns. Organic foods, however, are more expensive than their conventional counterparts (Gil *et al.*, 2000; Zepeda *et al.*, 2006; Corsi *et al.*, 2003; Thompson, 1998). This, coupled with questions regarding the levels of knowledge by Canadians about organic foods and their production, suggests questions about the existence of price premiums associated with organic foods. This in essence

involves issues regarding the Canadian consumers' willingness to pay (WTP) for organically grown foods.

This study examines issues relating to consumer knowledge and the effect of price premiums associated with organic foods using the product 60% whole wheat bread. This type of bread product was chosen due to the fact it represents the market midpoint in whole wheat content between 0% (white bread) and 100% whole wheat bread. The central idea behind this research was to understand the role of information on the WTP for this type of bread. To do this, different information treatments were provided to consumers in order to uncover their effects on the willingness to pay price premiums.

## *1.1 The Information effects*

Information about the benefits and costs of organic production may or may not influence the decision of a consumer to pay a premium for organic foods (Hayes *et al.,* 2002; Honkanen *et al.*, 2005; Hu *et al.*, 2005). This raises the question of what information signals should producers of organic foods use to influence the purchasing behaviour of consumers. In the past information such as the geographical origin of the product (as a proxy for quality), color stability, packaging and brand information was found to affect the WTP for organic products (Enneking *et al.*, 2005; Walshe *et al.,* 2005; Stefani *et al.*, 2006). In this present study the effect of information regarding the possible health and environmental benefits of organic foods, and information regarding sensory acceptance criteria on a specific organic product, on WTP are examined.

The essence of potential health benefits to the potential consumer of organic foods is the presence of antioxidants (a group of chemicals naturally made

by plants to prevent damage by insects and other pests) because of the restriction in the use of synthetic pesticides in organic production practices. These practices result in decreased levels of synthetic pesticide residues in organic foods (Benbrook, 2005). To examine the influence of health information in this present study, insights from the UK food standards agency (Makatouni, 2002) regarding restrictions on certain ingredients and additives in processed organic food were provided to consumers. The information regarding environmental advantages of organic production presented to the respondents contained information about the sustainability of organic farming and the protection it offers over conventional methods through prevention of soil degradation, maintaining ground water quality etc. (Stolze *et al.,* 2000). Each respondent was presented with either the health or the environmental information on organic foods prior to being asked for their WTP for a loaf of organic 60% whole wheat bread to negate the possibility of overstatement or understatement of WTP (Whitehead *et al.,* 1991).

The sensory information also formed an essential part of this present study. The goal here was to shed some light on the consumer sensory acceptance of an organic bread product and to compare these to a conventionally produced counterpart (Bogue *et al.*, 2004). The sensory analysis here encompassed a special information treatment effect that influenced the respondents' rating of both bread products and this rating was used to help explain their willingness to pay a price premium for the organic product. The consumers were permitted to taste, smell and then rate the bread (60% whole wheat) on a nine point hedonic scale ranging from like extremely to dislike extremely. The respondents were asked to provide these ratings "blind" without knowing which bread product was produced using organic wheat, and also after having the product's wheat source revealed. Both of

these hedonic ratings involved the provision of information on the potential health or environmental benefits of organic production. The point of interest here was to capture the consumers' sensory preference change in ratings between the two bread types before and after they possessed information and to assess the impact of this preference change on their WTP for the organic bread type.

This complex provision of information to bread consumers makes this study somewhat unique. The presence of health or environment information, along with sensory attributes, provides additional information on consumer preferences regarding organic wheat products. The design and the rationale behind the structure of the survey pattern will be discussed in detail in Chapter 3.

## *1.2 Research Objective*

As discussed earlier, the primary goal of this study is to understand the effect of different types of information and their respective placements in a survey to study respondents' willingness to pay for organically grown wheat bread. To do this, the study used a closed ended contingent valuation framework (Carson, 2000) to estimate the WTP conditional on the types and the order of presentation of different types of information. This approach allows examination of two issues:, i) the price sensitiveness of consumers with respect to the whether the bread product was produced using organic or conventional wheat; and ii) whether different types of information treatments and the order in which they are presented had a significant influence on consumer WTP. Past studies have reported that consumers are willing to pay a premium for organically produced foods and that this behaviour is influenced by risk perceptions and the ethical background of the respondents (Maguire *et al.,* 2004; Wier *et al.,* 2001; Kuchler *et al.,* 2000). This

present study will attempt to validate whether similar behavior can be replicated with a set of Alberta consumers.

Numerous European studies have stressed that health or nutritional benefits determines influences demand for organic produce and that these consumers are willing to pay premium for organic foods as a result of these benefits (Millock *et al.,* 2002; Chinni *et al.,* 2002; McEachern *et al.,* 2002; Loureiro *et al.,* 2001; Shepherd *et al.,* 2005). Based on these findings we expect that Albertan consumers would be affected by similar factors. However, whether health benefits have a greater effect on consumption of organic products than environmental benefits remains an open question. We hope to shed some light on this issue in this study.

As described above, a distinct feature of this present study is the joint effect of types of information on the willingness to pay a premium for organic wheat bread. The health or environmental benefits would be one type of information that could affect WTP, but the affect of sensory features associated with the products could constitute an additional information effect. In their literature review comparing consumers' perceptions and preferences between organic and conventional foods, Bonti-Ankomah *et al.* (2006) state that product taste (i.e. flavour), freshness and shelf life are typically the most preferred features that consumers consider prior making purchase decisions. These authors report mixed results on the claim that organic foods taste better than the conventional counterparts based on past findings. They further report that in the past, studies have investigated the impact on consumers' choice of the above two food types based on food safety issues with respect to fertilizer content, on the basis of nutrition and chemical content for the food types purchased from retail stores, and

on the basis of alternative animal feeding trials. They conclude by stating that there exists no consistent and concrete evidence to support the claim that organic foods taste better than conventionally grown foods and that organic products are preferred. Thus, the Bonti-Ankomah *et al.* (2006) study also influenced this present research study to incorporate sensory attributes along with information provision in a WTP analysis.

Stefani *et al.* (2006) incorporate sensory information effects under blind, expected and labelled scenarios for the specialty food spelt, but only to estimate their parametric model by regressing limited right hand side variables on the changes in WTP for individuals across different places. The information was on the origin of the product and its impact on respondents' product evaluation and preference. But in this present research effort the treatment is differentiated by trying to predict the probability of WTP as a function of variables that are discussed differently under previous studies.

## *1.3 Thesis Structure*

The remainder of this thesis is comprised of six chapters. Chapter 2 reviews previous literature and provides some insights on past studies that are related to this study. A review of earlier literature that deals with information treatments like health, environment and sensory or personal attributes is provided. This chapter is organized into four sub-sections based on information treatment effects, sensory effects, consumers' characteristics and the presence and essence of price premiums.

Chapter 3 describes the survey employed in this thesis and further explains in detail its design and structure and a brief description of data collection methodology. The structure of the survey deals with the placements of blind and labeled sensory treatments for both health and environment information effects. The study further discusses the randomization of price premiums for both health and environment information treatments. This chapter also includes a section describing the data collection process and a brief explanation on the distribution of the data based on its source.

In Chapter 4 the hypotheses to be tested are formally stated along with the methodologies that are to be used to test them are discussed in detail. The methodologies include parametric and non-parametric techniques. Chapter 5 presents the results of both parametric and non-parametric estimations and discusses whether they support or reject the different null hypotheses stated in the previous chapter.

The final chapter focuses on potential policy issues based on the results from analysis in the previous section and how these policies could potentially affect the sustainability of the organic market in Canada.

# CHAPTER 2: A REVIEW OF PAST LITERATURE

## *2.1 Introduction*

There are many studies that examine various issues concerning organic farming, but only a subset of them are relevant to this research study. These studies have predominantly dealt with either the demand and/or willingness to pay for organic produce, or consumer preference for organic products based on comparisons to conventional production. All of these issues have been shown to be influenced by factors like (a) consumer characteristics such as ethnicity, socio-demographic factors, and attitudes towards health and environmental issues; (b) the influence of new information that updates a respondent's current knowledge level; (c) sensory attributes of the products; and (d) the consumer's relative sensitiveness to price. Magnusson *et al.* (2001) report that the majority of the past studies have dealt with factors like personal background information and consumer attitudes as important determinants affecting the demand for organic products. But the simultaneous impact of other factors as described above cannot be downplayed. This present study addresses this issue by developing a consumer study that examines the influence of a combination of factors on the demand for an organic product. However, before describing the methods and results of this, the results from the existing related literature need to be acknowledged and explored.

This chapter discusses the findings of past literature under three headings: 1) the influence of consumer characteristics such as sociodemographic variables and attitudes on demand for organic foods; 2) the effect of providing information on

the possible benefits of organic production methods or consumption of organic foods on demand and the role of sensory information; and 3) the role of price premiums associated with organic products on demand.

### *2.2 The Effect of Consumer Characteristics on Organic Demand*

Some studies have reasoned out the need for extrinsic and intrinsic attributes to understand consumer demand for organic foods (Enneking *et al.,* 2005). Extrinsic attributes will be discussed in the next section of this chapter pertaining to the provision of additional product information and its corresponding implication on consumer demand. What remains to be disclosed is the potential influence that consumers' background information and the levels of knowledge they possess in combination with new information will have on their final choice. This current section reports the findings of past studies that have analyzed the effect of respondents' socio-demographic factors including their attitudes towards health and environmental issues relating to organic foods on their WTP for organic foods.

Consumer attitudes with respect to health, environmental or food safety concerns can be based on the knowledge gained either through past experience or from any additional information they receive about products (Stefani *et al.,* 2006; Enneking *et al.,* 2005). There is a strong belief that consumer characteristics and information may indirectly or directly influence consumer demand expressed through sensory evaluation studies (Stefani *et al.,* 2006; Bonti-Ankomah *et al.,* 2006). More specifically, consumer preferences for organic over conventional food products is likely based on their attitude towards the respective methods of production (Bonti-Ankomah *et al.,* 2006).

### 2.2.1 The Effect of Psychographic Variables

The literature suggests that consumer attitudes towards organic products and their production may differ depending on the region of their residence and other personal characteristics of individuals (Zepeda *et al.,* 2006; Toit *et al.,* 2003). For example, some studies based on European consumers report pro-health attitudes or health concerns as a driving factor explaining organic demand (Magnussson *et al.*, 2001; Shepherd *et al.* 2005; Torjusen *et al.,* 2004). A literature report by Bonti-Ankomah *et al.* (2006) on many studies undertaken in Europe and North America suggest that pro-environment attitudes were also an important indicator explaining increasing demands for organic products. These differences necessitate examination of these findings.

Kihlberg *et al.* (2005) suggests three groups of attitudinal concepts that can affect consumer demand. These are: a) affective components (i.e. a value or a feeling); (b) cognitive components (i.e. a belief) and c) behavioural components which relates to a tendency to act or demand action. The authors suggest that affective components can operate alone or in conjunction with the other components to affect consumer demand. This present research study attempts to incorporate all of these attitudinal constructs under consumer concerns relating to health and environmental concerns.

Bourn *et al.* (2002) summarize information on the differences between organic and conventional farming systems. They use these differences as a way to shed light on the domination of positive health attitudes over attitudes relating to environment concern as an indicator of demand for organic foods. Magnusson *et al.,* (2003), examine the importance of non-sensory attributes in explaining

consumers' organic purchase decisions. A large number of these attributes are attitudinal. Magnusson *et al.* (2003) designed a questionnaire to infer the effect of three categories of non-sensory attributes on food choices. These categories are: a) consumer perceptions such as healthiness, environmental concerns and animal welfare issues; b) the possibility to predict consumer attitudes towards the purchase of organic foods on the basis of such perceptions and (c) self-reporting about recycling and other environmentally friendly behaviour. The results from their sample of 1154 Dutch consumers between the ages of 18 and 65 years revealed that the self purchase of organic foods was strongly determined by perceived health benefits. They also report that participating in environmentally friendly behaviour influences the purchasing of organic foods, but only because it involves lower economic costs combined with small behavioural costs. So the authors conclude that egoistic (private health benefits) motives shadow altruistic (environment friendly attitude) motives and that the latter is only effective in influencing organic purchase decisions when consumers gain some implicit private benefits. This Magnusson *et al.* study replicates the results reported by many other European studies on factors influencing consumer demand for organic foods.

McEachern *et al.* (2002) tried to verify the rationale behind the purchase by Scottish consumers of organic dairy products based on their purchase motivations and attitudes. Their study also tries to validate whether purchase behaviours are in accordance with the criteria of ethical beliefs. The ethical reasons which were identified and incorporated in their study were the declining state of environment; threats to animal welfare, and concerns regarding genetically modified organisms (GMO). They find that consumers' motivations for purchasing organic foods are revealed based on self-interest or self-centered attitudes. In other words organic

foods are purchased because they are better tasting, are safer to consumer etc. They conclude that to market organic foods and to achieve future market development the organic producers cannot rely solely on minor hardcore green consumers for sustainable growth of the industry. Their findings have paved way for future studies to concentrate on multi-attitude behaviour models to further understand organic consumption patterns.

Also sensing the relevance of non-sensory factors in understanding the consumption patterns for organic foods, Lockie *et al.* (2004) try to test for the inter-relationships between a wide range of motivations, attitudes and behaviours on the level of organic consumption for 1200 randomly selected Australian consumers. Their research study required the respondents to have had previous sensory experience of any organically produced food within the past 12 months prior to the survey. Their analysis found that consumer perception about the naturalness of food, their sensory experience enjoyed in the past coupled with their emotional experience of eating organic foods, and the frequency of organic food purchase, are highly influential factors that determine organic demand. Environmentally friendly behaviours like green consumption, recycling etc. also increase organic food consumption. Finally they stated that future research needs to include an interaction between sensory attributes and attitudes for analyzing future demand in order to promote organic foods.

Gil *et al.* (2000) attempt to provide a better understanding of the demand for a wide variety of organic foods with differences in price. They employed a close ended contingent valuation survey on randomly selected consumers from the Spanish regions of Navarra and Madrid who had at least some previous experience of organic food consumption, by defining the inclusion criteria and exclusion

criteria are implied. The results suggested that in addition to the size of price premiums, the presence of increased health concerns, diet, and apprehension regarding environment conservation increased demand for organic products.

Honkanen *et al.* (2006) emphasize the structural relationship between ethical food choice motives and attitudes towards organic food and in turn their impact on the demand for organic food by Norwegian adults. Similar to the study by McEachern *et al.* (2002) ethical beliefs in the Honkanen *et al.* (2006) study related more to social and environmental concerns related to food choices and not to moral ethical beliefs. The omission of health related attitudes scale in their study was due to the ambiguous claim that organically grown food is healthier than conventional counterparts. Therefore, their study focused on the relationship between ethical beliefs, organic consumption attitudes and the choice of organic food. The ecological motives had a high score and also had the strongest impact on the organic consumption attitude signaling the significant role played by environment and animal welfare concerns, echoing the findings by Squires *et al.* (2001) and Makatouni (2002). Honkanen *et al.* also inferred that political motives had a positive and significant impact on consumption attitudes, but that religious motives had very minor effects. The overall finding of their study suggests that consumers with positive attitudes with respect to organic food consumption are more likely to form intentions to consume them. This highlights the need to understand ecological and environmental beliefs in order to enhance consumers' demand for organic products.

Sensing the importance of rising global environmental consciousness, Schlegelmilch *et al.* (1996) attempt to ascertain whether variables pertaining to environmental consciousness have an influence on "green" purchasing decisions.

The authors examine various combinations of similar products with one being an environmentally friendly alternative, under various price scenarios. They develop a variable called 'environmental consciousness' using a multi-dimensional construct comprised of cognitive, attitudinal and behavioural components. The sample of consumers employed to develop their model consisted of students studying in the U.K who were predominantly male and tended to be members of higher social class and with higher levels of educational. The authors found a positive correlation between environmental consciousness and green purchasing decisions. In addition, environmental attitudes had higher explanatory power than political beliefs on the levels of knowledge of environmental issues on "green" purchases. This research effort suggests that researchers should include environmental attitudes in explaining consumer WTP for organic products.

Similarly Clarke *et al.* (2000) found that strong environmental attitudes amongst consumers increase their intention to purchase environmentally favourable products. However, other significant influential factors such as consumer perceptions of labeling, store location etc. were also important. The impacts of environmental attitudes type is significant to this present research analysis because De Haen states that "consumers who care about the environment have a high regard for organic farming" (Toit *et al.*, 2003). The environment attitude scale used in this present research study was based on the scale developed and incorporated by Clarke *et al.* (2000) in their study of environmentally favorable food products.

Toit *et al.* (2003), influenced by past research regarding the nature, growth and factors driving the growth of organic products, attempted to determine the beliefs regarding organically produced foods, organic farming systems and organic

purchasing practices of consumers in Cape Town (South Africa). The goal of their study was to propose marketing strategies to increase the demand for organic products in retail outlets. They report a detailed summary of past literatures that dealt with impact of factors like socio-demographic characteristics, sensory factors, ethical beliefs and attitudes, information provision, action behaviours of respondents and the role of price premiums on the final demand for organic foods.

Beliefs are usually seen as a synonym to knowledge possessed by consumers which they deduce on the basis of factors like their product assessment, choice of retail outlets, brand preference and previous consumption experiences etc. (Peter *et al.,* 1994). Sensing this, Toit *et al.* 's study focused on the nature of beliefs with respect to organic farming, coupled with the consumers' behavioural response towards organic foods that may induce changes in their particular behaviour but not on product differentiation with the similar conventionally produced type. The results from their data collected using survey methodology similar to that used by Roddy *et al.* (1996) and Magnusson *et al.* (2001), indicated that majority of respondents believed that organically produced food contained no artificial additives, fewer pesticide residues, more nutrients and overall was perceived as healthy and tasty. Most of the findings regarding the beliefs of organically produced food and organic farming were similar to the studies undertaken in U.K, Europe, North America and New Zealand. The majority of their respondents understood the nature of organic products and associated the benefits of organic farming as pro-environmental coupled with the humane treatment of animals. Furthermore these South African respondents trusted organic products only when they were sold at specialized retail outlets.

Becker *et al.* (2005) intend to rationalize the mechanisms that could influence consumer attitude and behaviour while purchasing organically certified products. The authors conducted their study in Sweden where KRAV labelled products represent organic certification. Their analysis was based on cognitive and action theories which were developed using levels of current knowledge possessed by the respondents. The authors found that the attitudes held by their respondents did not necessarily influence their actual behaviour – those consumers who possessed strong pro-environmental attitudes were not willing to pay higher prices for organic products. The identified reasons were: i) the respondents lack of regular purchases of KRAV products; ii) the fact that respondents were generally deficient in knowledge about those products; iii) the availability of the product; iv) the fact that the respondents were sensitive to price; and iv) and their ethical beliefs. It was understood that consumers perceive organic production as environmentally friendly, animal welfare oriented and bettered the working conditions in developing countries. The authors also report the dominance of pro-environment attitudes scale over health attitudes based on what they hoped rather than realized through their experience.

Squires *et al.* (2001) presented a cross-cultural study focused on the reasons behind consumption of organic food by factoring in concerns regarding health, diet, and, the environment as well as confidence in the conventional food industry. The respondents in this study were urban dwellers in Denmark and New Zealand. The authors report that pro-environmental attitudes, expressed through green self-perception, were a highly significant explanator of organic food consumption. From their study, it is noteworthy that green self-perception was a good predictor of total organic food intake but not a strong explanatory factor for the consumption

of organic foods as a proportion of overall food intake. They found similar relationships for health concerns only for respondents recruited from New Zealand, but found a negative relationship between confidence in conventional foods and organic consumption in both places. The above findings validate the claim that pro-environmental attitudes are relatively strong predictors of organic food consumption.

Lockeretz (2003) and Michelsen (2003) provide some important policy implications in two studies on the sustainability of organic agriculture. They highlight two key factors that are necessary for the growth and sustainability of this type of farming activity. Lockeretz explained the background and underpins the need for consumer knowledge on the impacts of organic farming on health and the environment. The possession of this information is likely to influence consumers' decisions to pay a premium for organic foods. Michelsen (2003) laid emphasis on the effective use of desired communication skills in agricultural policies such as educating farmers and citizens about the health and environmental benefits of organic production methods such that there is a significant positive shift in their attitudes.

Chung (1995) observed that changes in the food habits and dietary patterns amongst American consumers were similar based on the findings of past studies that indicated a shift in consumer concerns towards food safety and environment quality. Chung (1995) estimated the probability of some southern US consumers preferring organically grown products by simultaneously analyzing their preferences for organically grown products and the likelihood of choosing products with sensory defects. They report that pro-environment and health attitudes under the presence of sensory information coupled with the consumers'

past consumption experience of organic foods increases their likeliness to buy organically produced products.

### 2.2.2 The Effect of Socio-demographic Characteristics

Consumers acquire beliefs about products through their experiences which may be through direct contact with the product or through being exposed to other sources of information (Toit *et al.,* 2003). This experience or product knowledge could be due to the influence of personal characteristics such as educational level, income and age (Magnusson *et al.,* 2001; Stefani *et al.*, 2006; Toit *et al.,* 2003). While the previous section summarized some literature regarding consumer attitudes acquired through these beliefs and attitudes help to predict the individual behaviour, this section discusses the role played by socio-demographic characteristics in combination with consumer beliefs or values on the demand for organic foods.

Millock *et al.* (2002) used surveyed data collected from 400 randomly chosen Danish households to determine factors that influence the WTP for four organic products (milk, potatoes, rye bread and minced beef). The initial analysis exposed the neutrality of valued attributes across all organic products except for the avoidance of chemicals (such as pesticides) which was highly valued by the respondents. The estimation results revealed that the probability of WTP for the organic products decreased with age but variables such as the presence of small

children and attitudes towards the environment, nutrition and health were insignificant.

Chinni *et al.* (2002) suggests that standardized consumer habits like improved life style as a result of higher economic development coupled with product availability because of excellent functioning of modern food distribution channels, results in greater demand for organic products. Using the survey data collected randomly from Sicily in Italy, they try to infer the reasons behind the consumption of organic products. Their findings suggest that an increase in income, changes in family life styles and health benefits, have a positive effect on consumers' interest towards organic consumption. This signals the dominance of health concerns over environment awareness, which in turn influences the demand for organic products. As expected the price variable had an inverse relation with demand for organic products.

Sensing the role played by consumer ethical beliefs, risk perceptions and attitudes on health and environmental issues, Tsakiridou *et al.* (2006) assessed the extra price that the consumers are WTP for organically produced products. They analyzed the influence that consumers' sociodemographic characteristics and attitudes have on the WTP for a premium for organic foods. The results obtained from the probit estimation employing 660 observations suggest that socio-demographic variables such as gender, income, occupational status have a positive relationship with WTP for organic foods. They also found that pro-environment attitudes and high food safety concerns positively affect the WTP for organic foods.

Some studies have stressed factors like gender, age, education, income and pro-ecological values along with some sensory influence as important indicators

for organic consumption or preference (Lockie *et al.*, 2004; Chung, 1995; Lecocq *et al.*, 2003; Toit *et al.*, 2003).

Bower *et al.* (2002) in their study identify that the overall liking of margarine spread did not vary according to information, except for female respondents. The authors claim that this is because females are generally found to be more health conscious as reported in previous studies. In general it was found that liking of the product and additional product information did increase a respondent's intention to buy in spite of high price premiums. Other socio-demographic variables such as age and positive health attitudes significantly increased purchase intentions.

Wier *et al.* (2003) found that the presence of small children in the household along with higher consumer confidence in labeling had a significant and positive influence on the WTP for organic milk. However, health, environment and nutrition awareness variables were insignificant.

The above findings provide evidence that support the need to incorporate consumer attitudes and their socio-demographic characteristics in this current study. The studies reviewed essentially provide evidence of the influence played by consumers' personal beliefs which in turn influence their attitudes, and thus helping to predict consumer preferences towards organic foods for a given situation. The unobserved link is to verify whether attitudes and consumers response to the provision of additional information relating to those attitudes (e.g. health) have a similar impact on the demand for organic products (Whitehead *et al.*, 1991).

### *2.3 Information Treatments and Organic Demand*

#### 2.3.1 Why Do We Need Information?

The demand for organic foods is affected by the current knowledge possessed by consumers, but this effect differs if additional or new information is presented (Hayes *et al.,* 2002; Grunert *et al.,* 1995; Lange *et al.,* 2004). Bonti-Ankomah *et al.* (2006) report that organic products are credence goods which makes it difficult for consumers to differentiate them from the conventionally grown goods even after repeated purchase and consumption. This necessitates the need for certification or product information through third party verification. These authors also state that in general consumers in North America and Western Europe are well aware of organic foods, but globally there exists inconsistency amongst consumers about interpreting "what is organic?" Furthermore a number of studies have found that providing additional information about the health or environmental benefits associated with organic farming over conventional farming practices has a negligible influence on consumer willingness to pay or demand for organic products (Magnusson *et al.,* 2001; Shepherd *et al.,* 2005; Toit *et al.,* 2003).

This present research study dealt with three types of information: information of either the health or environmental benefits of organic production; and self assessed sensory information regarding the tastes, look and smell of an organically and conventionally produced product. The information on the health and environmental benefits was decidedly positive towards the benefits of organic farming, but the information regarding sensory acceptance evaluation was treated separately as an independent component. Thus, the sensory information literature will be discussed in a separate section. The studies that report the effect of health

or environment information or their combination in determining the WTP for organic foods are discussed below.

Akerlof (1970) proved that asymmetric information leads to market failure through adverse selection and moral hazard problems. Henneberry (2004) reported that asymmetric information affects the markets for quality-differentiated food products - for example organic foods have credence attributes which necessitates the need for third party monitoring. However, Bougherara *et al.* (2004) demonstrate that information overload can also lead to market failure. If the consumers are overloaded with information regarding the environmental attributes about the products, it can lead to the problem of adverse selection and moral hazard due to the free rider problem and the technical inability of consumers to process that information. Therefore Bougherara *et al.* suggest labeling as a way to mitigate this problem because it communicates accurate environmental characteristics about the products by laying emphasis on private benefits accrued to the potential consumer. This enables consumers to make choices that maximize their preferences, for example purchase of organic foods is motivated by self-benefits like safer products free of fertilizer and pesticides etc. Finally this helps in negating the possibility of market failure due to credence attributes.

Studies by Goldberg (2002) and Severtson *et al.* (2006) also stress the need for additional information with respect to health and environment benefits that has significant influence on the consumer preferences. The former states that market failure arises due to food safety concerns and can be negated by clear provision of information about the food products. The latter used a Common Sense Model (CSM) to show how consumers respond to additional information. Their findings revealed that people need concrete information about the environment and

personal risk for understanding and corresponding responses. The provision of this form of information has an indirect effect on policy beliefs and implications for the environment risk perceptions of consumers.

### 2.3.2 The Source and Nature of Information

The source of information and its relative nature can influence the direction in which organic food demand can move (Enneking *et al.,* 2005). The source of information informs consumers regarding the product's type and its geographical origin whereas its nature projects possible positive and negative aspects that arise due to its consumption. The positive or negative information could be pertaining to health or environmental related issued based on the product's nature of production method, for example organic or conventional.

Sensing this Hayes *et al.* (2002) observed how assertions made about food safety by advocacy groups and scientific experts combined with the nature of information, influence public decisions. So their research study examined how consumers respond to the controversy surrounding the provision of positive or negative information or in combination of both on the consumers' WTP for the control of *Trichinella* in irradiated pork. The authors conduct controlled laboratory experiments using a repeated Vickery auction mechanism for two types of pork sandwiches (with and without irradiated pork) branched into three different types of experiments based on three different information treatments. The results revealed that when positive information alone is made available, it led to a favorable assessment of the irradiated pork along with a higher WTP for it. But when jointly presented with negative information, then the positive information was dominated and the resultant effect was similar to the situation when only the

negative information was made available. This indicated that the respondents were highly sensitive to negative information.

In contrast, Rousu *et al.* (2002) found that the presence of negative information manifested by environmental groups and a verifiable third party increased the demand for controversial genetically modified products (GMO). This contradicting finding is due to the verifiable nature of the information environments and lack of bias in the provision of information involving GMO products. The result held even with the coexistence of positive information. The results were also inferred from an experimental auction mechanism comprising consumers representing two metropolitan areas in United States. The authors concluded that verifiable third party information has a small positive impact on the demand for genetically modified products and hence recommend the need for third party institutions to produce and distribute verifiable information about such products.

Recent studies have stressed that a system that encourages traceability of a product through the labeling process can provide valuable information like the geographical origin and production background of products to the consumers therefore influencing their preferences (Umberger *et al.,* 2003). Given the fact that traceability can help to identify inefficiency in the production process and may facilitate faster product recall, Dickinson *et al.* (2003) examined the WTP for traceability for the data sourced from U.S., Canada, U.K., and Japan through a Vickery auction mechanism. Following Liddel and Bailey (2001), they emphasize the concept TTA (Traceability, Transparency and Animal Assurance) which helps in providing consumers with valuable information about the product's characteristics plus facilitates in identifying inefficiencies and enables easy recalls

of products at times of crisis. They finally stress the need for devoting more resources towards tracability for the products for which consumers' WTP is the highest.

Product information expressed through labelling had a greater impact on consumers' choice than the sensory effect (Lange *et al.,* 2002). The study undertaken by Kihlberg *et al.* (2005) suggested that information about organic production had a significant positive effect on the liking of organically produced bread in Sweden. In general information advocating on the benefits of organic products are branched in to either health or environment or animal welfare (Bonti-Ankomah *et al.,* 2006). Incorporation of environmental benefits is the most preferred form of information type that is presented to respondents in most of the previous organic studies that dealt with information effects (Bonti-Ankomah *et al.,* 2006; Becker *at al.,* 2005; Huang *et al.,* 1991; Soler *et al.,* 2002; Toit *et al.,* 2003).

Combining auction mechanisms with information provision regarding the nature of organic production Soler *et al.* (2002) examined whether this form of information treatment affects consumers' WTP for organically produced olive oil in Spain. The use of the repeated experimental mechanism facilitated the introduction of different price premiums along with the repeated provision of information therefore making this form of combined price and information treatments unique. They found that environmental attitudes and environment information corresponded provided through ecolabelling dominated health attitudes therefore shadowing the latter's effect in understanding the respondents' WTP decision. They concluded that there is a joint price and information effect, wherein the repeated provision and the relative placement of latter could increase consumers' WTP.

Many non-organic food studies stress the dominance and need for health information about food products as a an important determinant in analyzing consumer choice or demand (Enneking *et al.,* 2005; Bogue *et al.,* 2004; Bower *et al.,* 2003; Stefani *et al.,* 2006).

### 2.3.3 The Influence of Sensory Information on Organic Demand

From the above discussion it is evident that WTP can be determined by the provision of additional information. Additional information could be based on extrinsic and intrinsic attributes of a product, and this section of the study concentrates on the essence of the latter. Sensory (intrinsic) attributes for a product includes appearance (color, shape), smell, taste and product consistency (Enneking *et al.,* 2005; Bonti-Ankomah *et al.,* 2006). Respondents should be willing to pay more than usual if they like the taste of the product (Bower *et al.,* 2003). Kihlberg *et al.* (2005) and Lockie *et al.* (2004) find that consumers liked the taste of products if it had an organic root or content. When sensory attributes coexist with extrinsic product attributes, then the latter is dominant (Lange *et al.,* 2002; Enneking *et al.,* 2005). However this is not a universal finding (Bogue *et al.,* 2004; Lockie *et al.,* 2004; Hu *et al.,* 2005). These findings lay a firm foundation for this research study to accommodate sensory attributes through taste evaluation with and without product label information to explain final demand for the specific type of wheat bread. This additional feature will also enable the researchers to capture the joint influence of information types and sensory attributes which would otherwise remain unobserved.

Sensory evaluation represented through ratings can be treated as a proxy for consumer acceptance of a product (Kihlberg *et al.,* 2005), but is insufficient to

capture the effects in fast moving markets. This requires intrinsic attributes to be presented with extrinsic attributes (Enneking *et al.,* 2005; Jaeger, 2006). To facilitate an easy understanding of the essence of sensory information on consumers' WTP in this present study in combination with extrinsic attributes, it is vital to discuss the impact of these attributes on non-organic product demand first and then on organic demand.

Lange *et al.* (2002) examined the effect of sensory evaluation gained using an 11 point hedonic scale of likeness in combination with product information on the rationale behind consumer choice for five brut non-vintage champagnes under two different scenarios. The scenarios were based on the sensory evaluation of the champagnes under blind and revealed scenarios. The blind situation involved taste evaluation and rankings before the vintages of each bottle were made available to respondents. The revealed taste evaluation involved tasting and rating after the vintages and bottle labels were observed by the respondents. Following previous sensory studies with similar patterns, the results of their study indicated the presence of an assimilation effect - sensory evaluation under full information was different from the blind sensory evaluation. Thus, this signals the essential part played by the presence of external information on the intrinsic tastes. Similar sensory acceptance evaluations were undertaken under an auction mechanism to reduce the possibility of any experimental bias. The auction mechanism findings were similar to the hedonic method.

Following the experimental design by Lange *et al.*, Lecocq *et al.* (2003) conduct a second price Vickery auction mechanism for four different types of wines in three different rooms based on differential provision of extrinsic information type with and without sensory acceptance evaluation. The extrinsic

information involved revealing label information and extracts from wine guides. They replicated the findings of Lange *et al.* by exposing the presence of an assimilation effect, as their respondents' WTP was not affected if extrinsic information provision preceded sensory acceptance evaluation. Conversely, if the blind taste evaluation was followed by label information and wine guide extracts, then the respondents' WTP increased significantly.

Bogue *et al.* (2004) state that marketing research is capable of measuring extrinsic attributes like price, packaging etc., but the inclusion of intrinsic attributes facilitates end-users with an option of making trade-offs for sensory characteristics. Therefore these researchers used descriptive sensory analysis to analyze the influence of sensory characteristics on the range of full-fat and reduced-fat dairy products. Their analysis interprets the distinct role of sensory information as it generates a different perspective than marketing analysis. Their study further lays firm emphasis in identifying key quality attributes through sensory analysis for specific products which in turn can be combined with food marketing techniques to target specific groups in the process gaining competitive advantage.

Enneking *et al.* (2005) employed a similar approach to Bogue *et al.* for three types of orange flavored carbonated drinks. Enneking *et al.* included extrinsic attributes such as brand, price, calorie reducing label and sweetening system along with sensory attributes across 691 consumers. The results from their analysis revealed that consumer preferences were dictated by brand information but the price variable is insignificant.

Bower *et al.* (2002) combine both forms of attributes in a study of preferences for butter but introduce a specialized type of information – the

presence of health and nutritional information on the label of a specific type of butter. They try to relate this information effect along with sensory evaluation on the WTP of the respondents. The sensory evaluation was conducted under blind and labelled scenarios targeted evenly among the respondents. The findings are in line with those of Lecocq *et al.* (2003) where the purchase decision was significantly affected by the degree of likeness of sample only when the label information was provided.

Based on the findings by Kajikawa (1998) and Carew (2000) with respect to willingness to pay for improvements in quality and taste of foods coupled with the introduction of modified varieties, Hu *et al.* (2005) examine the influence of sensory attributes like firmness and sweetness on the WTP for gala and red delicious apples. They use a double bounded contingent valuation method for the survey data collected from consumers in Portland, Oregon. Their results indicate that sensory attributes increase the WTP for the apples, but other factors such as education levels, eating frequency and race had significant effects only on the Gala apples but the not with the red delicious apples.

All of the above studies discuss the importance of either extrinsic or intrinsic attributes, but none of the above studies specify the possibility of one influencing the outcome of the other. Stefani *et al.* (2006) study whether information about the place of product origin (extrinsic attribute) influences its taste evaluation (intrinsic attribute). A specialty food, spelt, was used as a product to test for the sequential effect of product origin on the liking of the product and then on the WTP of the respondents. The data was collected from Italian consumers using a Vickery auction mechanism (nth random draw). The authors incorporated a design that permitted a combination of hedonic and monetary

evaluations along with three different types of information treatments which were blind, expectations (non-sensory), and full information. The regression results of these factors on the WTP decision revealed that product origin affected food evaluation and also has a direct impact on the WTP. There was also the presence of a strong assimilation effect. These findings validated the claim that sensory evaluation by itself is insufficient to understand consumer preference and that this understanding also requires the presence of extrinsic information.

The essential part of this present research study is to capture the combined influence of sensory evaluation of organic and conventional whole wheat bread along with information types on consumer demand. This necessitates an understanding of how previous studies incorporated the role played by sensory attributes of organic foods relative to conventional on the organic demand.

Kihlberg *et al.* (2005) studied the combined influence of sensory properties along with product information on consumers liking for of different types of bread grown, harvested and baked in Uppsala, Sweden. The experiment was designed to understand the interaction between bread taste, consumer values, beliefs about farming systems and the health effects as factors necessary to measure the respondents liking of the bread when information was made available. Therefore the principal goal of their study was to analyze the reaction of consumers to information provision coupled with sensory evaluation in the form of acceptance tests.

Their study used four different types of baked bread samples namely conventional flour only, organic flour only, a combination of organic and conventional flours and the admixed amaranth (a mix of conventional & organic bread samples). The pattern of the experiment was ordered such that the provision

of information on benefits of organic farming systems preceded the health information associated with organic bread consumption. The taste evaluation test was similar to that followed by Lange *et al.* (1999). However the results suggested that consumers who value food safety as a high priority and those who are regular buyers of organic bread were more likely to like the bread with different types of information. Perceived taste attributes had an important influence on liking for the organic bread than the demographic variables. Information with respect to the origin of organic flour had a positive influence on liking of the bread and this was true predominantly for the regular consumers of organic foods. Generally the information type provided to each consumer dictated their liking of the organic bread type.

Therefore, extrinsic attributes appear to dominate intrinsic attributes for organic products. The Kihlberg *et al.* (2005) study is the basis for introducing sensory analysis in this present research study to capture what determines the willingness to pay for the 60% organic whole wheat bread. This study extends the research undertaken by Kihlberg *et al.* by utilizing a differential treatment and relative placements of information types and sensory evaluation gained from the survey to understand the nature of multiple effects on consumer choice.

"Credence goods have high pre and post costs to detect quality" (Andersen *et al.,* 1998), hence require a third party certification for the typical product. Organic goods are credence goods (Greene, 2000), which means consumers find it hard to distinguish them for similar types of products produced under conventional farming. So to counter this problem, Heuvel *et al.* (2006) use the Quality Guidance Model (QGM) to expand their research vision beyond the sensory properties by incorporating credence motivations like health benefits (including safety),

environmental favourability, and naturalness to explain consumer behaviour. For marketing to be a success it is important to deliver goods that satisfy consumers' tastes and other associated benefits such as possible related health and environment issues. QGM satisfies these criteria by integrating consumers' perceptions with physical product characteristics (i.e. quality expectations at the time of purchase and quality experience at the point of consumption for the same good). The feature of this study is that the QGM is extended to include credence attribute perceptions to capture consumers' preference for three types of tomatoes. Their findings reveal that, consumers' credence motivations like health, environmental, safety issues and the preference for naturalness influenced their choice.

Verifications of these credence attributes are impossible at stores, hence the purchase decision is mostly driven by beliefs and perceptions like healthiness that the consumers possess or what they infer additionally. Although there is a small link between consumer expectations formed at the time of purchase and consumer experience (taste evaluation) realized after purchase, the former determines consumers' purchase decisions.

Bonti-Ankomah *et al.* (2006) discuss the existence of another school of thought on organic agriculture that claims no taste differences or likeness between organic and conventionally produced products. Walshe *et al.* (2006) in their seminal work on sensory differences between organic and conventional beef products report no significant differences in taste, odour, flavour, juciness and dryness between the products and also identify similar levels of antioxidant content. They finally question the validity of price premiums charged by the

organic industry when they and others have found no significant sensory and content differences for the products produced through the two farming techniques.

Questioning the sustaining capability of conventional farming system, Reganold *et al.*, (2001) report the sustainability of organic, conventional and integrated apple production systems in Washington between 1994 and 1999. Their data indicated that the organic system ranked superior to the integrated and the conventional systems with respect to environmental and economic sustainability, firmness, content of acidity (tartness), and sweetness. All the three systems were rated uniform with respect to texture. They also report that the integrated and organic farming systems require a price premium for the producer to break even.

Elliot *et al.* (2002) on the other hand refute the claim made by Reganold *et al.* (2001) on the superiority of organic farming techniques over the conventional one with respect to apples in Washington State. Elliot *et al.* find that there exists no significant difference between organic and an integrated farming system with respect to yields, soil quality, pests and nutrient content etc. from the results of Reganold *et al.* They also question the essence of higher price premiums for organically produced products when the differences between the systems are minor or very close. They claim that in terms of pure economic costs, there is not much difference between the systems and recommend the promotion of an integrated system for overall market efficiency. This supports the findings by Bourn *et al.* (2002) on the presence of pesticide residues and nitrate content as a major differentiating factor between the two farming systems. According to their findings, the principal difference between the two types of farming methods boils down to the content of pesticide residues present in the conventional method. They also report the absence of any strong evidence that organic foods are more

susceptible to microbiological contamination than the conventional counterpart and further recommend future research studies on the concentration of nutrients between the two systems.

The above section summarizes studies where sensory properties have played a crucial role in analyzing consumer demand in general and also specific to organic demand. This past literature supplies rather mixed empirical results with respect to the influence of sensory attributes on consumer demand for organic foods (Bonti-Ankomah *et al.,* 2006).This raises an important empirical question to be verified in this present study, namely, do sensory attributes play a critical role in explaining consumers' WTP for 60% organic whole wheat bread?

### *2.4 Price Premiums*

There is an emerging body of research regarding the assessment of consumers' WTP for organic products which typically carry a price premium over their conventional counterparts. Generally the literature recommends the deflation of these price premiums to reduce impediments towards expanding the organic food market (Corsi *et al.,* 2002). So to capture the importance and the role played by price differentials on the demand for organically produced products the findings from several specific studies are discussed below. There is also a fine indication that socio-demographic, attitudes towards environment and health and provision of additional information does in fact induce respondents to pay a premium for the organic product.

A report by Kremen *et al.* (2001) for the United States Department of Agriculture suggested that prices for organic products were determined both

casually and formally by individual farmers or groups of farmers and that the existence or use of price premiums for organic crops depended on seasonality as well. The report further adds that there exists no uniform rule for determining differential price premiums in organic markets due to its size, volume, supply and production capabilities.

The existence of price premiums may be due to factors such as the acceptability of the foods to consumers, unavailability of the products in question due to seasonality, and higher costs of production accompanied by higher retail margins (Soler *et al.,* 2002). To predict the behavioural responsiveness of consumers to the presence of price premiums Soler *et al.* (2002) utilized an auction mechanism methodology which used real money and products for the product virgin olive oil. The authors used this approach to reduce the potential for hypothetical bias thought to be present in stated preference survey approaches. They found that accurate information, the presence of a reference price (i.e. the price of the associated conventional product), and consumer acceptability of labelled organic foods increased the WTP a premium for organic goods. The provision and presentation of information accompanied with the consumers' positive attitude towards natural food also resulted in an increase in the WTP for organic product. They further found that as income increased the respondents' interest for certified products increased, and so did their WTP a premium for it. Overall socio-demographic factors, price perceptions and attitudes had significant influence on their WTP.

Following the above approach, Botonaki *et al.* (2006) examined the impact of consumer attitudes and behaviour towards products produced organically and under a system of integrated management. The authors investigated the effects of

socio-economic characteristics and attitudes of consumers on their WTP premiums under the two types of certifying systems. The findings of their research uncovered low levels of knowledge possessed by consumers about the certification systems and that WTP higher price premiums for organic products depended on the respondents' health concerns, healthy eating habits, frequency of organic purchases and knowledge gained through different sources of information.

Corsi *et al.* (2002), recognizing that organic goods belong to a niche market (credence goods), tried to calculate the choke price for an organic product. This price is the price where the quantity demanded for the product is zero and is also termed the maximum price the consumers are willing to pay (MPWTP) for 1 unit of the organic product. By incorporating a double bounded contingent valuation methodology, the authors tried to determine the choke price for roasts and minute organic steaks for a random sample of consumers in Italy. They estimated the MPWTP equation for two groups of consumers, one being regular buyers of beef and the other consisting of those who have stopped purchasing beef due to the incidence of BSE. The average choke price that the respondents were willing to pay for roast beef was 75 % higher than the average current price of regular meat and only 53% more for minute steak. Higher income levels increased the respondents' WTP for organic meat who represent the second group category as these respondents have experienced BSE incidences in the past and hence are more willing to pay in need of food safety. They concluded that organic beef can enjoy some market share even with associated higher prices.

Zepeda *et al.* (2004) attempted to determine whether any difference exists in the WTP for organic products by Caucasian and African-American shoppers due to the influence of their insights, beliefs and behaviour patterns. They report that

African-American shoppers were more knowledgeable, receptive and positive towards organic foods and were also more likely to pay a premium for organic foods.

A study by Cicia *et al.* (2002) used a survey in organic food stores across Naples, Italy in order to estimate the preferences of regular organic purchasers with respect to the product extra virgin olive oil. This study predicted the important role played by prices as a signal of quality and the relative insignificance of visual appearance of the product. The authors found that regular organic consumers were highly sensitive to prices.

While a number of researchers have suggested a variety of factors that might influence consumers' willingness to pay a premium for organic foods, two factors appear particularly important. These are private health benefits accrued to an individual and altruistic feelings derived through the consumption of an organic product. For example, Kuchler *et al.* (2000) attempted to explain the influence of health benefits on the WTP a premium for organic goods. In essence these researchers examined whether the dollar value of health benefits derived by consumers from the consumption of organic food accounted for the price premiums they are willing to pay. It was found that the consumer values did not match the calculated threshold value meaning that the estimated value of health benefits made up a small portion of the organic premium. This suggests that there are unobserved benefits experienced by the organic purchasers. These benefits could be related to altruistic benefits such as no use of pesticides, animal welfare and safety issues etc. They also suggested that organic consumers see more benefits from their food purchases and have different risk assessment than consumers of regular foods. The authors finally conclude that the private benefits

of consuming organic foods may include more than perceptions of potential health advantages gained by its consumption.

Wier *et al.* (2003) studied willingness to pay for organic milk products in the Danish market with data from 400 households. The econometric results revealed that consumption of organic milk was highly price sensitive. An increase in consumer demand for organic milk in the Danish market was due to trusted labeling, a constant supply at most retail outlets, and lower prices. They suggested that lower prices are likely associated with lower subsidies to organic products and levies on pesticides or commercial fertilizers.

Lengyel *et al.* (1999) report negative own-price and cross-price elasticities between organically and conventionally grown frozen peas, but the impact was marginal. They additionally found that the price of conventionally grown products did not have a strong impact on the quantity consumed of organic product. This behaviour was attributed to the presence of lower cross-price elasticities coupled with the consumers' desire to pay two times more for organically produced products over the conventional counterpart.

Other studies have found the maximum price premium (over the conventional price) that the respondents are willing to pay for organic foods. Toit *et al.* (2003) and Magnusson *et al.* (2001) report that more than half of their total respondents were prepared to pay 10%-20% and 5%-10% more for organic foods in Cape Town and Sweden respectively. Hay (1998), however, found that Canadians were not willing to pay more than 25% more for organic products. Price premiums for organic livestock products in Europe are relatively low with the exception of milk which ranges between 8%-36% and organic wheat which varies from 50% - 200% more than the conventionally produced product (Jones,

2003). Jones (2003), further reports that an analysis by Haring *et al.* (2001) on the organic marketing in Europe found that the average profits of organic production are similar to those for conventional farms.

The findings by Thompson *et al.* (2001) regarding baby foods suggested that the own-price elasticity for organic baby foods are higher, indicating a large change in quantities consumed for an initial small change in price. Inspired by this finding, Maguire *et al.* (2004) estimated the organic price premium for baby food at $0.03 to $0.04 per ounce by applying a hedonic price model to understand the characteristics of various baby foods. They concluded that this premium reflected the consumers' willingness to pay for a reduction in pesticide exposure.

### *2.5 Summary*

The previous four sections in this chapter discuss in detail some past research findings pertaining to consumers' willingness to pay for organic foods based on their reaction to new information, the influence of sensory information, their characteristics (i.e. their socio-demographic background, habits, life styles and attitude towards health and environment) and their relative price sensitivity. A consistent, and unsurprising, result across these studies is that when consumers possessed pro-environmental and health attitudes, they were more inclined to pay a premium for the organic goods. Although, there have been mixed views regarding which of the attitudes dominate the other. Many European studies express that pro-health motives have a greater effect on organic demand than altruistic motives. Additionally respondents' demographic characteristics such as their education level, their origin, age and their risk perceptions about food safety,

were some of the most important factors that influence the demand for organic foods.

Respondents may sometime possess less information or may lack concrete knowledge concerning food quality and hence require additional information in order to respond to a choice question such as WTP for organic food with a premium. Past literature has signaled the need for a clear provision of information because of the inability of most consumers to process too much information when made available. This suggests the importance of quality over quantity of information as a feasible option. There is strong evidence supporting the need for providing positive information in such a way that consumers' WTP can be affected. However, this positive information can be dominated by the additional presence of negative product information. There is some evidence that this may not be true in the case of organically grown products.

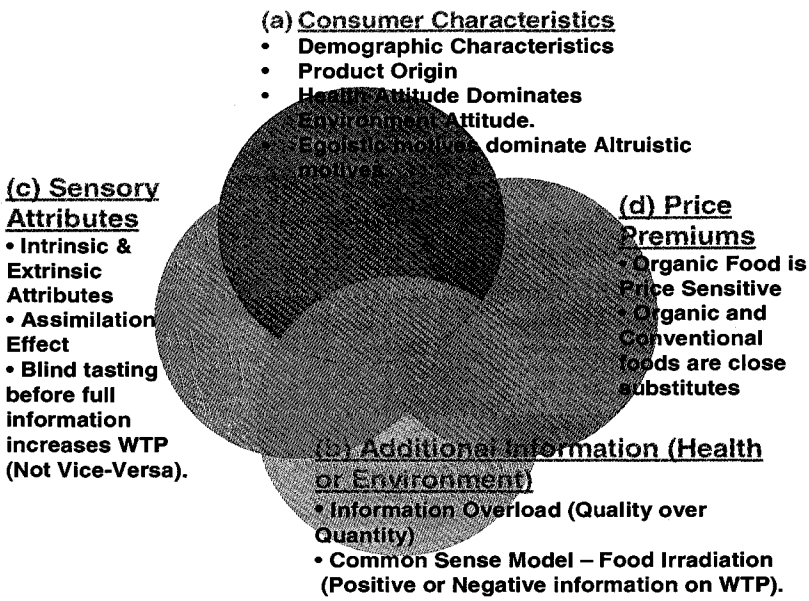
Previous studies have found that sensory attributes realized through blind evaluation increased the WTP of the respondents for the same product. This sensory information had a similar effect when coupled with product information – in addition, this information exhibited fewer incidences of assimilation effects. Thus, the presence of intrinsic attributes like sensory information along with extrinsic attributes seems to facilitate an increase in the demand for products. Past research has generally supported this claim and a number of studies have stressed that sensory attributes associated with organic foods increases their demand.

A bundle of studies have discussed the price sensitive nature of organic foods, in which the majority conclude that organic and conventional products are close substitutes due to their high cross and own price elasticities. There have been studies that have investigated the combined effect of consumer and sensory

attributes to sense their joint significance on the WTP a premium for organic products. Their findings reveal that positive attitudes towards consumption do increase this WTP only for a small premium, and that this propensity is dependent upon other factors such as the respondents' origin, ethical background, socio-demographic characteristics etc. When there are multiple combinations between sensory attributes under blind and labelled scenarios along with product information, the WTP is higher in the scenario when blind sensory evaluation is followed by extrinsic product information for the product which is non-organic in nature. Other sensory studies pertaining to organic products also arrive at similar conclusions.

This present research study attempts to combine all the above factors in a single analysis in order to infer their joint and individual effects on the respondent's WTP for organic products. This present study is an intersection of the above factors with differential treatments aimed to elicit consumers' willingness to pay for 60% whole wheat organic bread is represented in graphical format (see Figure 1). The underlying structure of the survey used to accomplish these goals is explained in the following chapter.

Figure 1: A graphical summary of past literature



# CHAPTER 3: THE ELEMENTS OF THE SURVEY AND DATA COLLECTION METHODS

## *3. 1 Introduction*

The principle objective of this research was to analyze the impact of specific factors on consumers' willingness to pay a premium for 60% organic wheat bread. The salient explanatory factors, summarized in the literature review above, are: (1) consumer characteristics which includes their attitudes and socio-demographic factors; (2) the availability of additional information on either the health or environmental benefits of organic production and sensory acceptance evaluation; and (3) product price premiums. The principal aim of this study is to understand which of the above factors, either independently or jointly, influence consumers' WTP for organic wheat bread.

## *3.2 Why Wheat Bread?*

The Swedish research study undertaken by Kihlberg *et al.* (2003) that combined sensory properties along with product information on consumers' liking for different breads inspired this present research study. Like the Kihlberg *et al.* study, bread was also used in this present study to examine consumer preferences for organic products. Since baked goods using wheat, rye and oats formed about $2.8 billion in sales in Canada during 2003, and wheat flour accounted for 82% of all cereal products consumed in 2002 (Stevens, 2005), wheat bread was used as the product in this study. Additionally the use of wheat flour enabled this study to use sensory acceptance evaluation for two types of bread samples based on the farming technique employed in producing the respective flours. As indicated earlier, the choice of 60% whole wheat in baking the bread products was due to

the fact it represented the market midpoint in whole wheat content between 0% (white bread) and 100% whole wheat bread.

### *3.3 Product Preparation and Sensory Evaluation Methods*

A notable aspect of the present study is that the research team invested considerable efforts into producing organic and conventional bread products that were similar to each other as much as possible. This was accomplished through careful control of the growth, baking and packing of the respective wheat bread samples. Typically any differences present while baking and milling conventional bread types is due to soil and crop management practices used in growing the grains used (Mason *et al.*, 2006). In this study the Canadian spring wheat variety Park, representing 114 years of wheat breeding, was grown under paired organic and conventional farming regimes. The grain was grown at University of Alberta production plots approximately 1 km apart during the year 2005. The resulting wheat grains were milled into 60% whole wheat flour and baked into bread under identical conditions at the Leduc Food Processing Development Centre in Leduc, Alberta.

The bread loaves were stored at -20 degrees Celsius two hours after baking and were thawed prior to conducting taste evaluations. The principal investigators of this study engaged in consistent slicing of the loaves and the resulting slices were packed in self-sealing sandwich bags. This process is permissible under sensory testing regulations and was conducted during the mornings of each survey period (Annett *et al.*, 2006).

The sensory evaluation of the bread products involved taste evaluations using a nine point hedonic scale ranging from 1 to 9 where 1 represented "dislike

extremely" to 9 which represented "like extremely". Thus, higher ratings on the scale indicated the respondents' higher liking for the product. Respondents were required to smell, feel and taste the bread and were asked to rate each slice following written instructions on the survey. Filtered water was provided as a palate cleanser between samples during the sensory evaluation (see Appendix D). This procedure is a typical methodology used by food scientists in examining the sensory qualities of foods (Lawless *et al.*, 1998). The incorporation of this type of evaluation as part of the survey makes this study distinct. Note that to incorporate this in a survey setting requires personal contact with each respondent. Therefore, the sensory evaluations were conducted in one on one contact with the researchers.

### *3.4 Consumer Characteristics*

#### 3.4.1 Attitudes

To gain deeper insights about the respondents' background and to further understand the nature of their responses, information on their health and environmental attitudes were collected. This involved developing lists of attitude items or statements followed by a requirement to rate these statements on some scale. For the health attitudes the scale consisted of five statements on views about health issues and a requirement for the respondent to provide a rating consistent with their opinion (see Appendix A.4, p. 125). This rating ranged from 1 signifying "Not at all" to 5 which represented "A Lot". These health questions were based on Kenneth A. Wallston's work on Multidimensional Health Locus of Control Scales (Wallston *et al.*, 1978).

For the environmental attitudes seven questions were adapted from a research study undertaken by Clarke *et al.* (2000) on attitudes and behaviours

towards eco-labels. For each statement the respondent was required to provide their level of agreement ranging from 1 representing "Strongly disagree" to 5 meaning "Strongly Agree".

These attitude scales were validated by pre-testing them on about 500 undergraduate students at the University of Alberta. The Cronbach's $\alpha$ for each scale was well above the acceptable threshold value of 0.70, thus providing a degree of validation of the reliability of these scales (Santos, 1999).

### 3.4.2 Other Respondent Characteristics

Information regarding the respondents' personal background and their behaviour patterns is required to understand their preference, hence questions regarding their demographic characteristics, purchasing and consumption habits is usually gathered in a survey. The demographic questions asked the respondent to provide their gender, age, household income and education level. In addition, respondents were asked to provide some information on their related consumer behaviour such as purchasing habits like brand loyalty, frequency of purchase and servings per day of whole wheat bread etc.

Knowledge about respondents' membership or association with environmental organizations can be important characteristics. As such respondents were asked if they belonged to environmental organizations such as Ducks Unlimited, Green Communities Edmonton Association, Environmental Direct Action Network, etc.

A copy of the entire survey is shown in Appendix D.

### *3.5 The Information on Organic Production Provided to Respondents*

An important research issue in this study was the presence and relative placement of various types of information with the sensory acceptance evaluation so that their relative impact on the consumer's WTP a premium for the 60% whole wheat organic wheat bread could be understood. Past studies on information provision have investigated consumer responses to either full product label information (origin, traceability, etc.) or more generally regarding the attributes of a production system. This study followed the latter course. In our study, respondents were provided with information on either the health **or** environmental benefits of organic farming systems.

The health information, shown in Figure 2, was reported in two segments. The first reported the health benefits that may be gained from consuming organic foods due to the increased presence of antioxidants in the products as a result of organic production methods (Yu *et al.*, 2004). The benefits reported were with respect to the reduced incidence of heart disease and some cancers due to the increased presence of antioxidants. The second segment informed respondents of the Canadian and the United Kingdom Food Standards Agency definitions and stated benefits related to organic farming system.

The environmental information (Figure 2) informed the respondent about sustainability and the harmony that may co-exist with the environment due to the practice of organic farming. The recommendation of the Canadian General Standards Board on the protection of environment, minimization of soil degradation, decreased pollution etc. was also mentioned.

Figure 2: Health and Environment Information

**Health Information:**

Fruits, vegetables and grains grown under organic farming practices tend to contain higher levels of antioxidants compared to their conventional counterparts. According to recent research, a high antioxidant intake has been associated with a lower incidence of heart disease and some cancers.

Antioxidants are naturally made by a plant when it is attacked by insects. The National Standards of Canada for Organic Agriculture prohibit the use of most synthetic pesticides and fertilizers on crops and soil. Since pesticides are not allowed, the plants produce more antioxidants to discourage insects. This also results in fewer synthetic chemical residues in food.

Organic food products may also contain fewer food additives. For example, in the United Kingdom, the UK Food Standards Agency restricts certain ingredients and additives in processed organic foods such as:

- artificial colorings and artificial sweeteners
- MSG (monosodium glutamate)
- Hydrogenated fats

In each case their use has been restricted because of evidence that they may be damaging to health.

**Environmental Information:**

The basic idea of organic food production is to ensure that the organic farm is sustainable and operates in a manner harmonious with the environment. Voluntary guidelines for organic agriculture have been set up by the Canadian General Standards Board. They recommend that organic farmers:

Protect the environment
Minimize soil degradation and erosion
Decrease pollution
Optimize biological productivity
Promote a sound state of human, animal and environmental health
Recycle materials and resources when possible
Maintain the integrity of organic foods and processed products from initial handling to point of sale

The National Standards of Canada for Organic Agriculture prohibit the use of most synthetic pesticides and fertilizers on crops and soil. This results in less harm to the environment. Organic farmers must use other management methods and selected varieties to prevent diseases and resist pests.

### *3.6 Willingness to Pay Price Premiums*

To elicit consumers' WTP price premiums for organic bread, a discrete choice contingent valuation methodology (CVM) was employed. While CVM is

commonly used to evaluate the monetary value placed by consumers on non-market value goods (Carson, 2000), Gil *et al.* (2000) suggest that CVM is useful for understanding the WTP for organic products given that these markets are still thin. CVM is not always the best approach if the concerned good is not a complete substitute for the previously available good (conventional good) (Corsi *et al.*, 2003).

The CVM method provides reliable results if certain methodological guidelines are closely followed and is effective while analyzing the WTP for goods that have multiple attributes and options (Duberstein *et al.*, 2003). As mentioned earlier, the use of this specific survey type was inspired by similar applications used in other relevant studies. The closed ended CVM question incorporated in this study is shown in Figure 3.

The first part of the CVM section involved presentation of a brief cheap talk script. Empirical findings in the past have suggested that CV methodology often induces overstatement of real economic value due to hypothetical biases (Harrison and Rutström, 2002; List and Gallet, 2001; Murphy *et al.*, 2003). The incorporation of a detailed "cheap talk" scripts, following Cummings and Taylor (1999), can reduce or eliminate this hypothetical bias. Other studies have suggested similar effects can be achieved even with briefer cheap talk scripts (e.g. Murphy *et al.*, 2004). Thus, this brief approach was utilized here. The script informed respondents about overestimation issues that have occurred in these types of studies in the past and urged respondents to keep "real world" concerns in mind as they respond to the CVM question.

The respondents' WTP for organic products was investigated through a "take it or leave it" stated choice question conditional on the random presentation

of one of seven assigned price premiums. Participants were asked if they would be willing to purchase a loaf of 60% whole wheat organic bread at a price above the baseline price for a similar type of conventional bread, with premiums chosen at $0.50 intervals ranging from $0.25 to $3.25. These values of these price premiums were developed from an informal survey of relative prices for bread loaves at various supermarkets and organic specialty stores in Edmonton.

Following this choice question involving the price premium, the respondents were asked how certain they were of their answer and to answer one additional question regarding purchase of organic bread if its price was the same as conventional bread. This information is typically added to CVM designs to assess the accuracy of the respondent's answer and to elicit more information about their preferences.

Figure 3: The closed–ended CVM question employed to understand the willingness to pay price premiums for 60% whole wheat bread.

*We are about to ask you if you would purchase an organic product at a certain price. Previous surveys of this nature find that the amount of money people SAY they are willing to pay is sometimes higher than the amount they would ACTUALLY pay for this product. For this reason, as you read the following question, please imagine that you would ACTUALLY have to pay this amount keeping in mind what you normally pay for groceries for you and your family.*

Assume that the cost of conventional bread on average is $1.50/loaf at the store where you usually shop. On your next shopping trip assume you need to buy one loaf of bread. If organic bread were available for purchase, would you purchase this organic bread if it cost range ($0.25 to $3.25)/ loaf more than the conventional product, in other words if the total price of the organic bread was range ($1.75 to $4.75)/ loaf?

Yes ☐ No ☐

1. If you answered "yes" to the question above, how certain are you of your answer?

| Very Certain | Somewhat Certain | Unsure | Somewhat Uncertain | Very Uncertain |
|---|---|---|---|---|
| ☐ | ☐ | ☐ | ☐ | ☐ |

If you answered "NO" to question 1, would you buy this loaf of organic bread if the price was the same as the average price of conventional bread?

Yes ☐ No ☐

### *3.7 The Design and Structure of the Survey*

The entire survey consisted of two parts. Part A contained general questions and was administered to every respondent, whereas part B contained different treatments which were randomly assigned among respondents. These different treatments involved the type and placement of the information regarding organic production, the placement of one set of sensory evaluations and placement of the CVM section. Each of these will be discussed in turn below.

Part A of the survey was designed to collect general information about the respondents' personal characteristics, consumption and purchase decisions along with their behaviour such as frequency of bread consumption etc. A key element of this part of the survey was the sensory evaluation component. The first part of the sensory exercise was a "blind" sensory evaluation, where respondents were given one slice each of organically and conventionally produced 60% whole wheat bread in sealed plastic bags labelled with an assigned three-digit codes. The information regarding the codes and the true nature of bread content were known only to the research investigators. In this process the consumers were asked to smell, feel and taste and then rate these attributes for each of the bread samples as per the

instructions on the survey. The ratings were measured on a nine point hedonic scale ranging as described above.

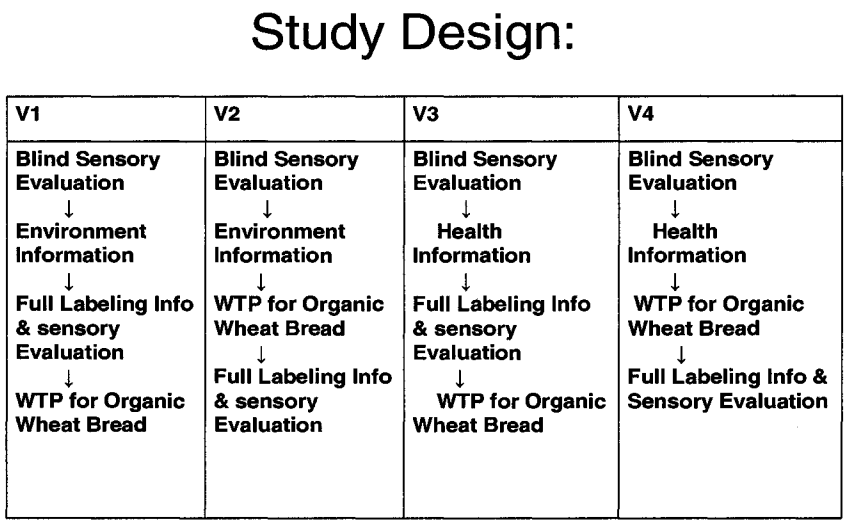
Part B involved the provision of information on either the health or environmental benefits of organic products. The respondents were then required to perform another sensory acceptance evaluation. However, this time the samples were truthfully labelled as containing conventional or organic ingredients. This second treatment was either immediately preceded by or followed by the CVM question. The detail regarding the experimental design is discussed below in detail.

While the first part of the survey (Part A) was common to all respondents, one of four versions of Part B was randomly assigned to each participant in order to investigate possible information and sequencing effects. This second part contained either the health or environment information. A further treatment split was made regarding the ordering of the fully labelled sensory acceptance evaluation of the two bread samples and the respondents' willingness to pay decision for the organic wheat bread conditioned on randomly assigned price premium levels. A summary of this splitting of the experimental design is illustrated in Figure 4 below. The respondents were aware of the issue, nature and content of the bread while they performed the sensory acceptance evaluation for the fully labelled bread samples. In this case, the respondents enjoyed more product information then they did under the blind evaluation exercise while answering part A of the survey. Each of the four versions contained different information either based on price bid or ordering or type of information, which could influence their WTP decision.

Random assignment of the seven bid levels within each of the four versions described above means that there were actually 28 forms of the survey that were

administered to participants. Appropriate measures were taken to guarantee that these bid levels were equally distributed across survey times and locations.

Figure 4: A diagrammatic summary of the study design.




### *3.8 Survey Administration*

Exactly 392 individuals participated in this study, of which two responses were incomplete and were subsequently dropped, resulting in 390 successfully completed surveys. The consumers who participated were recruited via face-to-face intercept in shopping malls, supermarkets and organic specialty stores in Edmonton and Red Deer, Alberta, as well as on the University of Alberta campus. There were about two sessions for each location except for St. Albert Mall and the organic specialty stores. Each session lasted for about seven hours (approximate) from morning to evening. The respondents were given general information about the purpose of the survey and were asked to complete a consent form (conforming to University of Alberta Human Research Ethics Board requirements) prior to

participating in the survey. The respondents were permitted to participate only if they did not have any allergy concerns related to bread ingredients. Each respondent approximately took 15 to 20 minutes to answer the entire survey.

# CHAPTER 4: HYPOTHESES AND ANALYTICAL METHODOLOGY

### *4. 1 Defining Hypotheses*

Bonti-Ankomah *et al.* (2006) and Thompson (1998) provide a detailed review of many consumer demand studies regarding organic products and the factors that play a key role in determining consumer WTP. Their reviews indicate that past studies relate consumers' preference for organic products based on provision of additional information, consumers' perceived concerns with respect to health and environment, the role of price, store effects (place) and other socio-demographic variables. Guided by their insights and other previous empirical findings, this study tested the following hypotheses.

**(a)** Stated purchase decisions for 60% organic whole wheat bread are price sensitive.

**(b)** The availability of additional information on health and environmental benefits about organic farming systems has a positive impact on the WTP for organic whole wheat bread.

**(c)** The combined effect of sensory evaluation and the provision of additional information types positively affects the respondents' WTP for organic whole wheat bread.

**(d)** Organic consumers are willing to pay more for the organic whole wheat bread.

**(e)** Certain demographic characteristics of respondents significantly affect their WTP.

**(f)** Respondent pro-health concerns (attitudes) are better determinants of their willingness to pay premiums for the organic whole wheat bread than their pro-environmental concerns.

### *4.2 Econometric Estimation*

To test these hypotheses both non-parametric and parametric estimation methods were used. The former is useful for regressions with flexible functional forms, while the latter imposes assumptions about the functional form of the regression function that either has a linear or non-linear relationship with the independent variables etc. (Vickers, 2005). Generally parametric estimation is applicable or suitable when the distribution of the error term has a known distribution and if there exists a reasonably large sample size. However, this present research utilizes a single non-parametric Turnbull estimation procedure and parametric estimation techniques to examine the relationship between the variables that can explain consumers' WTP decision for organic wheat bread. Unlike the parametric estimation, the Turnbull estimates do not impose any distributional assumptions nor use any covariates (additional exogenous variables) (Bulte *et al.*, 2005).

#### 4.2.1 Parametric Estimation

The respondents' decision to pay for the organic wheat bread is conditional on the price premium they face, but there is a strong possibility of other factors determining the purchase decision. Hence it is vital to acknowledge these possible exogenous variables and understand their relative impact on the WTP decision. Due to the binary nature of the CVM responses (Yes, No) we follow tradition and utilize a binary logit model to estimate the effect of influential variables on the probability of a respondent choosing "Yes" in the CVM question. This dependent variable 'WTPYES', takes the value '1' if the respondent answered Yes to the decision to

purchase the 60% organic whole wheat bread and '0' otherwise. To help explain their answers the effects of the information type alone and in combination with their sensory ratings, the price premium, and their individual specific characteristics were examined, with regards to the probability of stating a willingness to purchase a loaf of 60% organic whole wheat bread. The logistic model uses maximum likelihood techniques to estimate the parameters where the error term follows Type I extreme value (Greene, 2002), hence logistically distributed. Here five model specifications were estimated. The following equation provides guidance regarding these various specifications:

$$\Pr(WTP = Yes) = \Pr(Y_i = 0) = \alpha_0 + \beta_p \Pr ice + \beta_B' B_i + \beta_Z' Z_i + \beta_{If}' If_i \quad \text{(Eq.1)}$$

Where *Price* is the bid faced by respondent I in the CVM question, $B_i$ are the respondent *i*'s purchase behaviours, $Z_i$ are respondent i's individual specific characteristics such as socio-demographic and attitudinal factors, *If* is the information treatment faced by respondent *i*, and

$\alpha_0, \beta_p, \beta_B, \beta_Z$, *and* $\beta_{If}$ are parameter vectors to be estimated. The logit model form takes the following form in this estimation (Greene, 2002):

$$\Pr(Y_i = 1) = \frac{\exp(\alpha_0 + \beta_p \Pr ice + \beta_B' B_i + \beta_Z' Z_i + \beta_{If}' If_i)}{1 + \exp(\alpha_0 + \beta_p \Pr ice + \beta_B' B_i + \beta_Z' Z_i + \beta_{If}' If_i)} \quad \text{(Eq. 2)}$$

Based on past research findings, apriori expectations of the signs for the coefficients can be developed. For example, we expect the price variable to carry a negative sign reflecting a negative relationship with the respondent's choice of willing to pay for the bread. If the respondent is a regular purchaser or consumer of organic bread, then we expect them to be willing to pay a premium for the product and hence the coefficient will have a positive sign. Past studies have inferred that

females are more likely to purchase organic foods, so one expects the coefficient associated with the female genders to be positive here along with similar signs for higher education and income categories. In European studies many respondents with pro-health attitudes were willing to pay premiums for organic foods, therefore we expect a positive sign for this coefficient and we further expect that the health attitude parameter be larger than the coefficient on pro-environmental attitudes. If the consumer liked the taste of bread then the expected sign of its parameter would be positive for its coefficient along with the coefficient of order one. Order one here is a dummy variable that takes the value '1' if the second part of the survey was organized such that the sensory acceptance evaluation precedes the WTP question and '0' otherwise. This dummy captures the implicit impact of taste evaluation on consumers' choice of WTP. A combination of the variables, order one dummy and the information dummy results in an interaction variable that postulates the joint effect of the information types on the respondents' choice of WTP for the product and the same signs are expected as above.

Since the possible health benefits of organic foods have been prominent in past consumer studies, this research expects a positive sign for a dummy variable associated with the provision of health information to respondents. All of the above predictions are expected to be influenced by past inferences, but the actual estimates are delivered in the next chapter.

### 4.2.2 Non-Parametric Estimation

A non-parametric estimation procedure was used to draw conclusions regarding the maximum premium the respondents who said 'No' to the CVM question are willing to pay for the organic wheat bread. The 'No' response could have risen due to higher price premiums received in their respective CVM question.

Therefore, to capture the respondents' minimum WTP for a loaf of organic wheat bread a Turnbull estimator was used. This estimator assumes no distribution for the error term, nor does it include other independent variables. It is aimed to capture the expected lower and upper bounds of WTP for those respondents who said 'No' to a premium taking into account their respective variances.

The estimator predicts the probability of an increase in the No response as the price bid levels increase. Thus, for a monotonically increasing distribution function a set of monotonic restrictions will have to be imposed so that the Pr(WTP $\leq$ \$ bid levels) (Haab *et al.,* 2002). The Turnbull estimate is used to find the expected (WTP) in this study for the 'No' respondents as they are consistent estimates of the distribution masses at each price. Turnbull lower bound estimates are considered as an alternative test in empirical investigations as these estimates do not impose any distributional assumptions (Bulte *et al.*, 2005). The price at which the distribution function passes 0.5 is the lower bound on the range of median WTP. The median here represents probability of a 'No' response equaling 0.5. Therefore, the estimate can only be defined by a range because of the discrete number of points (Haab *et al.,* 2002), and consequently this requires the estimation of lower and upper bounds for WTP to best capture the 'No' respondents' WTP. The lower bound projects the lower value of the range or the minimum WTP value for the respondents who said 'No' to their respective WTP question. Intuitively, the upper bound symbolizes the maximum amount that particular respondent is WTP. The variances are calculated to identify the accuracy and the divergence of the above estimators.

The equations for calculating the Turnbull lower and upper bounds along with their respective variances are provided by Habb *et al.* (2002) and are reproduced below (Haab *et al.* 2002):

**The Expected WTP (Lower bound):**

$$E_{LB}(WTP) = \Sigma_{j=0}^{M} t_j (F_{j+1}^{*} - F_j^{*}) \qquad \text{(Eq.3)}$$

**The Variance of Expected WTP (Lower Bound):**

$$V(E_{LB}(WTP)) = \sum_{j=1}^{M*} \frac{F_j^{*}(1-F_j^{*})}{T_j^{*}} (t_j - t_{j-1})^2 \qquad \text{(Eq.4)}$$

**The Expected WTP (Upper Bound)**

$$E_{UB}(WTP) = \Sigma_{j=0}^{M} t_{j+1} (F_{j+1}^{*} - F_j^{*}) \qquad \text{(Eq. 5)}$$

**The Variance of Expected WTP (Upper Bound):**

$$V(E_{ub}(WTP)) = \sum_{j=1}^{M*} \frac{F_j^{*}(1-F_j^{*})}{T_j^{*}} (t_{j+1} - t_j)^2 \qquad \text{(Eq.6)}$$

Where $j$ is the range of price menus for each category, is the corresponding bid received, 'M' is the number of respondents who said 'No' to the corressponding bid, $F$ represents the ratio of the number of respondents who said 'No' to the total number of respondents who actually received that particular price bid, and $T$ is the total number of respondents who received a particular price bid. 'M* and F*' represent the same measures for calculating the variance.

The values that arise from these calculations are good indicators of the value placed by respondents on the organic wheat bread measured by or deduced from

their expected WTP values. A smaller lower and upper bound values indicate the lower value placed by the respondents' who said 'No' for the organic wheat bread but a higher upper bound signals an increased likelihood of the respondents paying a higher premium as the observed median value is greater than under the previous case.

# CHAPTER 5: ANALYSIS AND RESULTS

### *5.1 Descriptive Analysis*

Table 1 provides a descriptive overview of the relationship between the demographic characteristics of respondents and the corresponding WTP decision for organic whole wheat bread. It can be seen that the number of respondents who were willing to purchase the organic wheat bread type increased with their income level. This is due to an income effect whereby higher purchasing power is attained as a result of higher income levels, which makes it feasible for these individuals to demand organic products given their higher price premiums (Thompson, 1998). A similar pattern is present with respect to educational categories where respondents with higher education levels are more likely to respond positively to the purchase question. Note that this ratio is particularly high for those who possessed at least some post-graduate education. A majority of respondents (about 63%) were not willing to purchase the organic product at a price premium. Females were more inclined to respond positively to the purchase question than males. Female respondents represented about 64% of the entire sample indicating a gender bias, but this could be attributed to their voluntary nature, i.e., the female respondents were more inclined to participate in the experiment as the research investigators were not permitted to persuade the consumers' to participate. About 42% of the female respondents agreed to pay for organic wheat bread carrying a price premium.

Another dummy variable capturing the respondents who had stated of being members in any environmental organization who said 'No' to WTP edged out those who said yes for the organic wheat bread. With respect to age the proportion of

respondents who answered 'Yes' generally increases with age, although this is not consistent across all age categories.

Table 1. A breakdown of the WTP decision according to various socio-demographic characteristics of the respondents.

| Variable Type | Stated Purchase Decision (across all bid levels) | |
|---|---|---|
| | No. of respondents who said "No" to CVM question | No. of respondents who said "Yes"to CVM question |
| *Income Categories* | | |
| No answer | 11 | 5 |
| < $36,600 | 91 | 49 |
| $36,601-$71,000 | 71 | 41 |
| $71,001-$115,000 | 55 | 36 |
| > $115,001 | 18 | 13 |
| *Education Categories* | | |
| Some high school | 13 | 8 |
| High School Graduate | 27 | 7 |
| Some university or college | 72 | 32 |
| College diploma/Deg. | 36 | 30 |
| Undergrad degree | 53 | 31 |
| Some P.G study | 26 | 12 |
| Post.grad. degree | 19 | 23 |
| *Males* | 102 | 39 |
| *Females* | 144 | 105 |
| Member of an Environment Organization | 26 | 18 |
| *Age Categories (yrs)* | | |
| 18-24 | 82 | 29 |
| 25-34 | 63 | 45 |
| 35-44 | 24 | 24 |
| 45-54 | 34 | 15 |
| 55-64 | 24 | 22 |
| 65-74 | 13 | 5 |
| 75 plus | 6 | 4 |

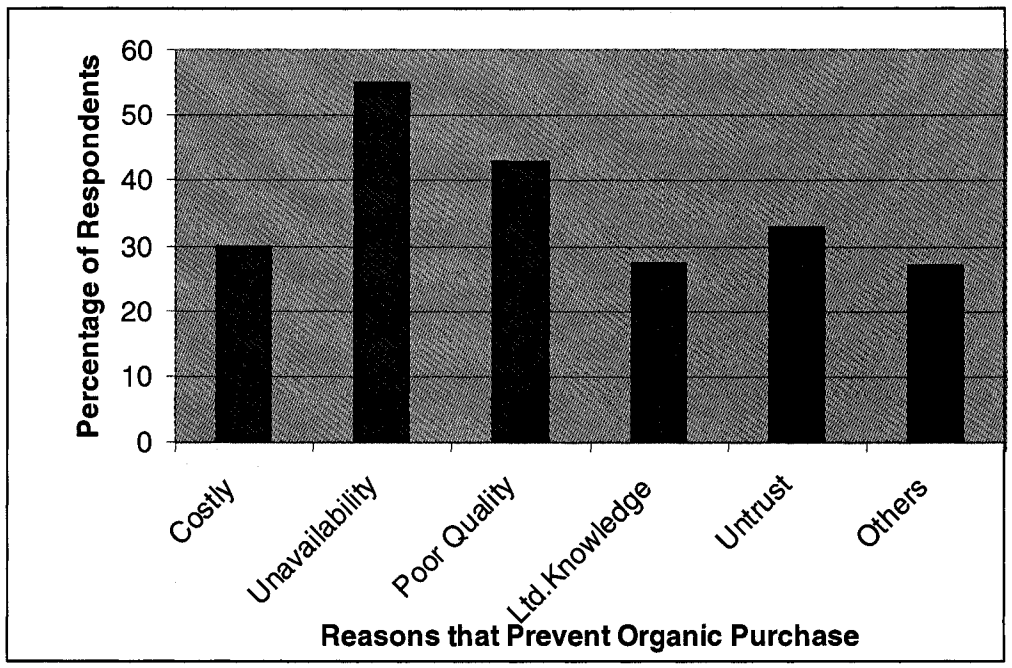
Table 2: Reasons for not purchasing the organic product.

| Reasons for not buying organic products | Yes-To-No Ratio (Percentage of respondents who said 'No' to the WTP question but 'Yes' to the following as reasons for not buying Organic foods). |
|---|---|
| Costly | 211 / (301) = 70% |
| Unavailability | 41 / (91) = 45% |
| Poor Quality | 28 / (49) = 57% |
| Limited Knowledge | 64 / (88) = 72% |
| No Trust | 41 / (61) = 67% |

Many studies have discussed factors such as poor availability, lack of trust in certification and the relatively expensive nature of organic foods as possible reasons for not purchasing them (Botonaki *et al.,* 2006; Thompson, 1998; Gil *et al.,* 2000; Ankomah *et al.,* 2006; Toit *et al.,* 2003). In this present research the primary reasons that appear to have prevented respondents from consuming organic products is their cost and the respondents' limited knowledge about organic products. The latter enjoys a slightly higher Yes-to-No ratio (i.e., the ratio between the number of respondents who said 'No' to willingness to pay for the organic wheat bread and those who said 'Yes' to reasons listed in Table 2) but the former is the reason most often cited across all respondents, as illustrated in Figure 5 below. About 30% of the respondents who felt that organic products are expensive decided to pay for it. This expensive nature associated with the organic products provides some limited support for the third research hypothesis described above.

Correspondingly, 55% of the respondents whose organic demand is affected by its unavailability were not willing to pay a premium for it.

Figure 5: Percentage of Respondents who said 'Yes' to WTP and 'Yes' to Factors that Prevent them from Purchasing Organic foods.




To understand the consumer's genuine reaction to sensory evaluation, a blind taste sensory acceptance rating was performed. Here the consumers rate bread samples that have three digit codes on them where the true nature of the sample is known only to the investigators in order to hold the respondents ignorant with respect to the identity of the samples. This evaluation is undertaken in the first part of the survey to capture the consumers' true taste evaluation of the bread samples in the absence of any influential factors. Once the different types of information are made available to the consumers, another sensory acceptance evaluation is undertaken on identical samples of the bread labelled with their true identity. Through the use of a combination of blended and identity-revealed sensory

acceptance evaluations this research study attempted to infer the potential impact of additional information provision on the sensory acceptance evaluation. This paves the way for three types of preference changes: positive, negative and no preference changes. These changes are arrived by comparing the sensory scores between blind and revealed sensory exercises. A positive preference change is defined as an increase in sensory rating of the 60% whole wheat bread produced either organically or conventionally under the revealed scenario over the blind situation. This implies that the consumers changed their preferences by eliciting a higher rating for the organic wheat bread after they received information (i.e. either health or environment coupled with the name of the sample prior sensory acceptance testing) than they did without perfect information and product knowledge. If this type of preference change occurs, then the consequent marketing policy suggestion would be to provide the type of information that induces consumer demand.

A negative preference change occurs when consumers behave in the opposite direction to the above scenario and a no preference change occurs when there is neither a positive nor negative preference changes. A positive or negative preference change in the sensory literature is commonly described as an 'Assimilation Effect' (Lange *et al.*, 2002). The presence of this effect can be verified in this research study.

Prior to comparing the variations in the sensory ratings it is intriguing to see how the ratings vary between conventional and organic wheat bread samples within the blind and identity-revealed evaluations (Table 3). The mean values of the sensory ratings suggest that there is a small difference between the mean values but no large significant rating change is observed. There is a negative preference change associated with respect to the organic sample and a positive preference

change for the conventional sample. This indicates some evidence of 'Assimilation effect' but remains inconclusive. This vagueness persists even in the figures of the distribution of the sensory ratings under the two situations seen in figures 6 and 7. These figures exhibit mixed patterns, for example the organic ratings did fall for the scores on the right hand side of the hedonic scale which represent higher end positive scores and the opposite is true with respect to the ratings of the conventional bread samples. So no firm conclusion is reached.

Table 3: Mean values (standard deviation in parentheses) of the sensory ratings under the blind and revealed exercises using the 9-point hedonic evaluative scale.

| Blind exercise | | Revealed Exercise | |
|---|---|---|---|
| Conventional bread sample | Organic bread sample | Conventional bread sample | Organic bread sample |
| 6.33 (1.75) | 6.66 (1.5874) | 6.82 (1.5494) | 6.31 (1.4028) |

Figure 6. Sensory evaluation ratings of conventional and organic bread in the blind exercise.

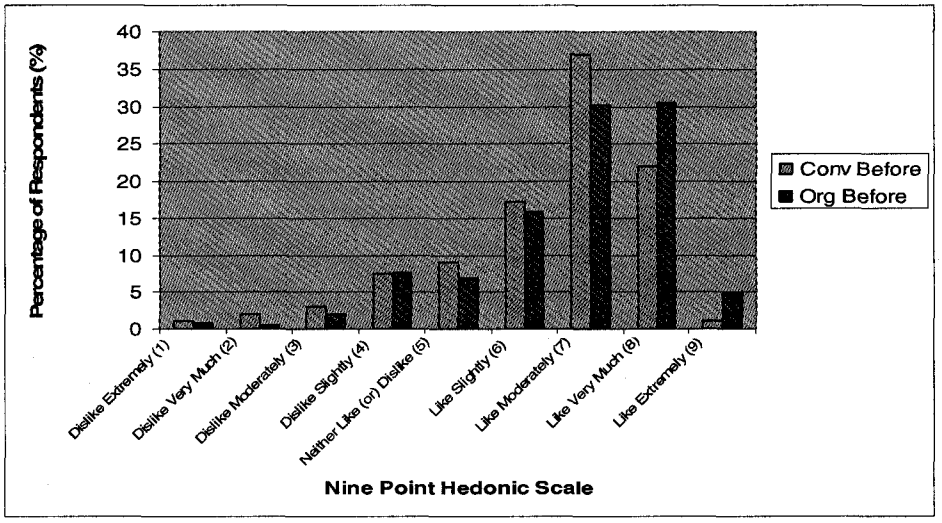
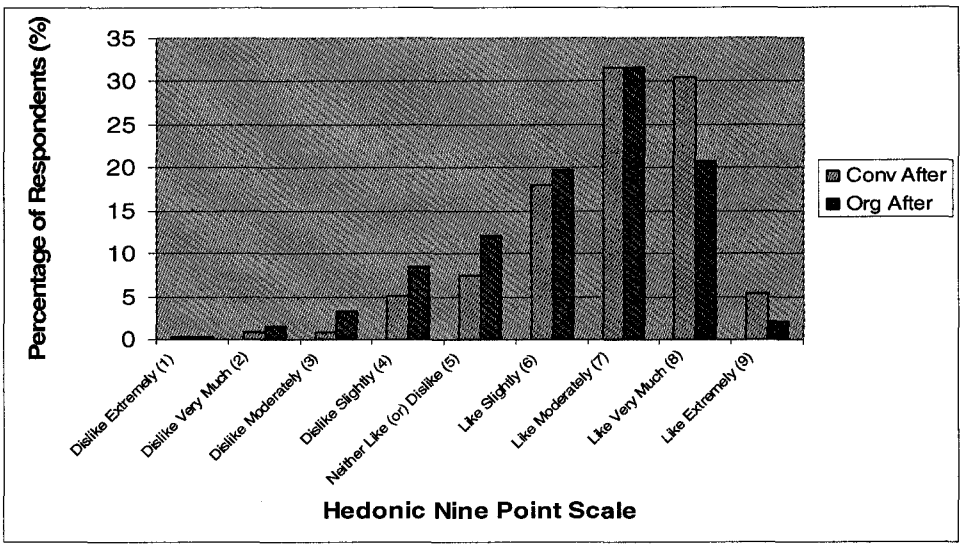


Figure 7: Sensory evaluation ratings of conventional and organic bread before in the revealed exercise.




Since the above graphical expression is inconclusive to identify the impact of sensory information on the changes in sensory scores, this research study introduces another innovative approach that graphs the difference-of-difference in sensory rankings of both organic and conventional bread samples. The central idea of this approach is to plot the numbers arrived from the equation of difference-of-difference in a graphical format (See Eq. 7).

$$\text{Dif-of-Dif} = \{(\text{Org}_{\text{Blind}} - \text{Conv}_{\text{Blind}}) - (\text{Org}_{\text{Labelled}} - \text{Conv}_{\text{Labelled}})\} \qquad \text{(Eq.7)}$$

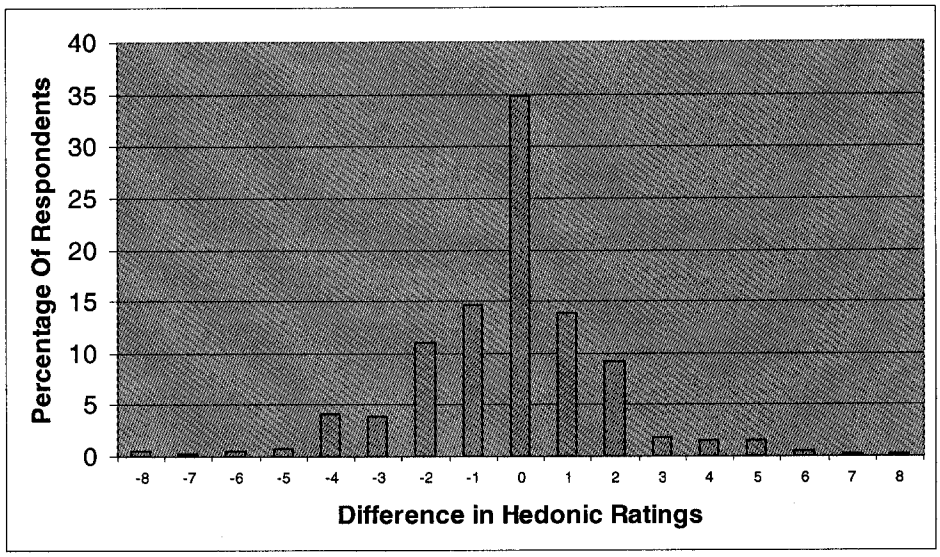
(Source: Stefani *et al.*, 2006)

From the above equation, if the graph is skewed towards the left then there is a positive preference change as a result of labelling and information effects. This suggests that the organic bread samples are liked more than the conventional samples under revealed situation than under blind scenario, while the opposite

change is true if the graph is skewed towards the right. A no preference change is true if the graph exhibits a shape of a normal distribution where the bulk of the differences is centered at zero. Figure 8 reflects a normal distribution with a slight skew towards the left. The above result implies that nothing can be firmly concluded regarding the respondents' liking of organic over conventional under which scenario or vice-versa. As claimed earlier the revealed scenario partially captures the implicit effect of information treatments and if the organic sample is liked under the revealed, the change could be attributed towards the information effects.

Once again none of the above graphs provide a clear indication on the patterns and the reasons behind the movements in sensory scores under both situations. Therefore in order to gain more insight in to the relationships between information types and sensory evaluation along with other crucial factors discussed in the previous sections, on the respondent's decision on WTP, the outcomes of the logistic estimates are discussed.

Figure 8: Respondents Sensory Preference for Organic over Conventional Before and After Full Information



## *5.2 Effect of Various Variables on the Willingness to Pay Price Premiums for Organic Bread*

### 5.2.1 Parametric Results

Five logit model specifications were estimated branching out from a base model holding the decision on WTP for the organic product as the common dependent variable. The variables included in the base model were price, socio-demographic characteristics, the average of the attitude scores on the health and environmental attitude scales, and dummy variables representing survey ordering and information types along with their interactions. Model B is branched into three specifications on the basis of selective inclusion and omission of sensory scores under the blind and revealed sensory exercises and their differences as explained above. Finally, model 'C' was estimated to address the significance of the data sourced from different survey locations on the respondent's WTP decision. The description of all variables employed in these regressions is presented in the Appendix (section A.1).

The base model was developed by a process of filtering out irrelevant variables that were insignificant in the model. A process of filtering was undertaken by using the Likelihood Ratio test (Greene, 2002) and this process enabled the removal of variables such as household income along with some of the educational dummies due to their relative insignificance in all the models. The environment and health attitude scales were tested for their reliability using their associated Cronbach's $\alpha$ which predicts the probability of the respondents' providing the same answers if the attitude questions were sorted differently and presented to them (Santos, 1999). The Cronbach's $\alpha$ values were greater than the benchmark (threshold) value of 0.70 (Santos, 1999) at 0.88 and 0.74 for the environment and

health attitude scales respectively. This confirms their reliability and the need for the use of all the statements or items in the scales as important components in the empirical investigation. Therefore, on the basis of this information the average scores or ratings of all the statements for both attitude scales were calculated and included in the logit models as possible explanatory variables.

The results of the logit regressions are shown in Table 4. The price variable carries a negative sign and is highly significant in all the models indicating that the probability of the respondents willing to pay a premium for the organic bread decreases as the price premium increases. Therefore, these respondents were price sensitive.

The dummy variable O1 represents a dummy for order one of the survey. This variable takes the value '1' if the sequence of questions were ordered by the respective information type followed by the labelled sensory acceptance evaluation and then followed by the WTP question, and takes the value '0' otherwise. Note that the base case for this dummy is order 2 where the WTP question preceded the revealed or labelled sensory evaluation. The variable O1 is insignificant in all five of the logit models.

The dummy variable HINFO, takes the value '1' if the respondent received health information and holds the value '0' if they received the environmental information. This variable carries a negative sign for all the models indicating that the presence of health information (*ceteris paribus*) resulted in the respondent being less likely to agree to pay for the organic wheat bread. The variables O1 and HINFO were also interacted and included in the logit model. The resultant variable (HSENSB), which represents the presence of health information in order one of the survey, carries a positive sign consistently and is significant at the 5% level in all

the model specifications. This suggests that the mere presence of health information alone was inadequate to persuade respondents to pay for the organic bread. However, when health information was available along with the revealed information taste evaluation, respondents were more inclined or more likely willing to pay for the organic product. In contrast, the sole presence of environment information was sufficient to persuade respondents to pay for the organic wheat bread. This finding is similar to those of Schlegelmilch *et al.* (1996); Kuchler *et al.* (2000) and Soler *et al.* (2002).

The average of the health attitude scale scores expressed as AVGHEA is insignificant in all the models. Conversely, the average of the environment attitude scale scores AVHENV is highly significant at the 1% level and carries a positive sign validating the fact that if a respondent possessed a high average pro-environmental attitude score on the environment attitude scale, then the probability that he or she is more inclined to pay for the organic bread is high. Whitehead *et al.* (1991) suggest that over or understatement of WTP for environment or health information is balanced by examining consumers' responses to the information about their health and environment attitudes that have been gained through the same survey instrument. Following the above statement by Whitehead *et al.*, this present study finds similar signs on the coefficients for environment information and the environment attitudes.

Of all the socio-demographic variables only gender, attainment of some post-graduate education and age were considered to be important in the filtering process and are hence included in this model. The probability of a respondent paying a premium for the organic bread decreases if the respondent is a male and increases if she is a female (the base case being females). This variable is

significant at 10 percent level in all models except model B3. Possessing graduate school education increases the probability of a respondent agreeing to pay the premium and is highly significant in all models. The age variable consisting of the midpoint of each age category for all the respondents is insignificant in all models. The midpoint represents the mean values calculated between the range of ages presented in the survey, for example the midpoint age for the age range between 25-34 is 30.

Models B1, B2 and B3 are all based on model A, but are distinguished from each other on the basis of including the related sensory variables based on the type of evaluation. These sensory variables are: organic taste evaluation under revealed scenario ORGL and the other two being the difference between organic and conventional scores gained in the blind and labelled exercises BLINDCHG and LABLCHG respectively. The variable BLINGCHG is insignificant, but ORGL and LABLCHG are both significant at 10% level with both variables carrying a positive sign. This signifies the fact that if a respondent rated their organic sample higher on the hedonic scale and also greater than the conventional sample in the identity-revealed sensory acceptance evaluation, then their probability of agreeing to pay a premium for organic wheat bread increased.

All of the models were tested for their significance using likelihood ratio tests where the restricted model in each case contained only the constant. The null hypothesis of this test is to verify whether the vector of coefficients associated with all independent variables in the unrestricted model are jointly equal to 0. The high values associated with the calculated Chi-square statistic for all the models based on the likelihood ratio test suggest rejection of the null hypothesis for each model.

The last row in Table 4 provides further insights into the high LR test statistics and their corresponding degrees of freedom.

Model C incorporates five survey location dummies into the base model. This model was estimated to reveal potential biases with the locations where respondents were actually surveyed. The dummy variable associated with respondents surveyed at the Strathcona's farmers' market was employed as the base case. It can be seen in Table 5 that the only place dummy that is significant is UOFA which carries a negative sign implying that the respondents who were recruited from the University of Alberta campus had a high probability of not willing to purchase the organic wheat bread. Another significant component of this regression was the interaction term O1OGS which is a product of the dummies associated with order 1 and organic specialty stores (place dummy). This variable is significant at 5% level and reduces the probability of respondents' being willing to purchase organic bread due to its negative sign. So respondents recruited from the organic specialty stores who received order 1 of the survey are price sensitive.

From the results of a logit model, the mean willingness to pay in terms of estimated regression coefficients and independent variables can be calculated by adopting the formula suggested by Donovan (2004).

$$\text{Mean WTP} = \{\sum \beta_n * (\bar{A}_n)\} / - (\beta_{\text{Price Bid}}) \qquad \text{(Eq.8)}$$

where $\sum \beta_n$ and $\bar{A}_n$, represents the coefficient estimates and mean values of all the right hand side variables in the logit regression except for the variable price. Therefore, the expected WTP for each respondent can be computed by inserting the coefficient estimates and their corresponding actual values in Eq.8. For this thesis, we estimate the mean WTP for the average respondent by utilizing the average of the explanatory variables across the sample of respondents. The resulting value is

$0.31 which suggests that for this sample a premium of this amount would result in a probability of purchase of greater than 50%. On the contrary a higher mean WTP premium value of $0.93 is arrived from Eq.8 when only the price variable is regressed on the WTP choice. This amount is much higher than the base model involving certain covariates.

Table 4: Parameter estimates for five logit models where the dependent variable was the probability of accepting the price premium provided in the CVM question.

| Variable Name | Parameter (standard error) | | | | |
|---|---|---|---|---|---|
| | Model A | Model B1 | Model B2 | Model B3 | Model C |
| Price premium (Price Bid) | -0.850 *** (0.12880) | -0.8696 *** (0.13041) | -0.8443 *** (0.12935) | -0.8327 *** (0.13000) | -0.9014 *** (0.13471) |
| Order One (O1) | -0.50597 (0.33918) | -0.52624 (0.34027) | -0.51069 (0.33970) | -0.54559 (0.34231) | -0.118E-01 (0.42569) |
| Health Information (HINFO) | -0.5794 * (0.34001) | -0.5698 * (0.34184) | -0.58245 * (0.34035) | -0.59611 * (0.34253) | -0.53056 (0.34588) |
| HSENSB (Health -> Sensory -> WTP) | 1.0380 ** (0.47840) | 1.0449 ** (0.48035) | 1.0518 ** (0.47955) | 1.0852 ** (0.48214) | 0.93279 * (0.49540) |
| Male | -0.4769 * (0.26275) | -0.45988 * (0.26371) | -0.46068 * (0.26486) | -0.40415 (0.26737) | -0.48554 * (0.26879) |
| Age | 0.474E-02 (0.764E-02) | 0.334E-02 (0.776E-02) | 0.493E-02 (0.765E-02) | 0.552E-02 (0.773E-02) | -0.385E-03 (0.895E-02) |
| Graduate School (EDU 7) | 1.0101 *** (0.37501) | 0.98503 *** (0.37760) | 0.9949 *** (0.37598) | 0.93370 ** (0.38063) | 1.0396 *** (0.40167) |
| Health attitude (AVGHEA) | 0.26619 (0.22702) | 0.23794 (0.22872) | 0.26417 (0.22791) | 0.25110 (0.22873) | 0.26344 (0.23927) |
| Environmental attitude (AVGENV) | 0.8523 *** (0.20363) | 0.82053 *** (0.20451) | 0.8473 *** (0.20398) | 0.8159 *** (0.20542) | 0.7164 *** (0.21296) |
| Organic Labeled (ORGL) | ---------- | 0.15044 * (0.891E-01) | ---------- | ---------- | ---------- |
| Blind Change (BLINDCHG) (OrgB-ConvB) | ---------- | ---------- | 0.347E-01 (0.688E-01) | ---------- | ---------- |
| Labelled Change (LABLCHG) (OrgL-ConvL) | ---------- | ---------- | ---------- | 0.15350 * (0.83E-01) | ---------- |
| Organic Speciality Stores (ORGSTORE) | ---------- | ---------- | ---------- | ---------- | 0.44470 (0.45202) |

| | | | | | |
|---|---|---|---|---|---|
| Shopping Malls (MALLS) | ---------- | ---------- | ---------- | ---------- | -0.62860 (0.45210) |
| RedDeer (REDEER) | ---------- | ---------- | ---------- | ---------- | -0.52397 (0.46699) |
| University of Alberta (UOFA) | ---------- | ---------- | ---------- | ---------- | -1.0041 *** (0.39179) |
| Interaction of Organic Shoppers and Order one (O1OGS) | ---------- | ---------- | ---------- | ---------- | -0.20612 ** (0.967E-01) |
| Others (OFFCAMP) | ---------- | ---------- | ---------- | ---------- | -0.23955 (0.36758) |
| CONSTANT | -3.681 *** (1.1719) | -4.3781 *** (1.2424) | -3.6858 *** (1.1763) | -3.6034 *** (1.1710) | -2.4822 * (1.2842) |
| Likelihood ratio Test $\chi^2$ (Chi square statistic) | 91.37497 [9] | 94.29717 [10] | 91.63209 [10] | 94.97421 [10] | 110.2709 [15] |
| ESTRELLA R-SQUARE | 0.22740 | 0.23443 | 0.22802 | 0.23606 | 0.27260 |
| MADDALA R-SQUARE | 0.20887 | 0.21478 | 0.20939 | 0.21614 | 0.24629 |
| CRAGG-UHLER R-SQUARE | 0.28531 | 0.29338 | 0.28602 | 0.29524 | 0.33642 |
| MCFADDEN R-SQUARE | 0.17789 | 0.18358 | 0.17839 | 0.18490 | 0.21467 |

Note: (a) (...) stands for standard Error; (b) *, **, *** stand for 10%, 5% and 1% level of significance;
(c) [..] stands for degrees of freedom for Chi square distribution in the Likelihood Ratio Test.
(d) The description of Variables is provided in the Appendix (Appendix I).

### 5.2.2 Non-Parametric Results

The calculated expected lower bound WTP for the respondents who answered 'No' to their respective WTP question conditional on the price premium was $0.43 and the corresponding calculated upper bound value was calculated to be $0.68. Thus, the resulting mean premium is $0.55. Note that this is the price over the base price of $1.50 for a loaf of 60% conventional wheat bread. So the mean market price that the respondents (who said 'No') are willing to pay for a loaf of 60% organic whole wheat bread is estimated to be $2.05. The variance for the

above estimates was calculated and the resultant values were close to zero at -0.079949882 for the lower bound and 0.008351 for the upper bound. The calculated mean WTP from the Turnbull estimator is just above the mean WTP arrived through the use of logit coefficient estimates and corresponding mean values of the independent variable. Therefore, both the parametric and non-parametric WTP estimates have relatively low mean values.

The Turnbull estimator results guide us by answering a part of our research question with respect to price sensitivity, but more on the grounds of calculating the maximum premium that the respondents would be willing to pay for the organic good. The smaller the lower bound estimate is, the lower the consumers place value on these goods and the more they are price sensitive. The findings of this study indicate that the majority of respondents chose not to pay for the respective price bid they received. Further, the Turnbull results also suggest that these respondents' were willing to pay a lower price premium signaling their price sensitivity to the organic product.

Overall, a majority of respondents were not willing to purchase the organic bread when faced with high prices, i.e., they were not inclined to pay a high premium for this specific organic product. Nothing concrete can be concluded about the characteristics of this group of consumers as the Turnbull estimation process ignores their influence. What is gained through this estimation process is simply the approximate value that these 'No' respondents place on this particular type of organic product, which is low as evidenced by the results.

The non-parametric findings differ significantly from the parametric results and this is commonly attributed to the absence of any covariates and assumptions regarding the distribution of error term under the former. The presence of

covariates such as demographic factors can deflate the mean WTP than when calculated by Turnbull estimation. For example, factors like relatively lower income levels, young age and gender may significantly determine the eventual choice. Within parametric estimation procedure there is a significant difference between the mean WTP estimates calculated with the presence and absence of certain control variables like demographic, action behaviour and other factors. The calculated mean WTP value is $0.93 without the control variables and is $0.31 under their presence. The lower value is conditional on multiple factors, but the unconditional value is of interest, as it signals potential demand to be tapped by sellers in spite of higher prices.

# CHAPTER 6: CONCLUSION AND POLICY RECOMMENDATIONS

## *6.1 Introduction*

This study provides an analysis of the possible factors that could trigger the respondents' willingness to pay for the 60% organically produced whole wheat bread. Based on the past empirical and theoretical evidences, certain key factors affecting organic demand have been incorporated in this research. These factors are the respondents' characteristics including their socio-demographic characteristics and the knowledge or information they already possess revealed through their behavioural attitudes, their response to new or additional information along with the presence of sensory attributes and finally their relative sensitiveness to the menu of price premiums. The distinct part of this research study where other studies have failed, is the combination of all the above factors coupled with their unique orderings roped in the CVM survey in order to sense the respondents' decision on the WTP for the organic wheat bread, thus making this research the first of its kind with respect to an organic food in a Canadian market. Based on this central idea six different hypotheses were proposed to be verified in Chapter four by using parametric estimation technique along with a Turnbull estimator (non-parametric estimation). This research uses the former as the principle research tool whereas the latter was adopted to realize the respondents' minimum and maximum expected WTP for the organic product in this study.

The organic market is very small in Canada but Lockie *et al.* (2004) report its global retail value to be about US $100 billion by 2010. Hence there is a need to postulate suggestions to enhance the marketing of the organic product in the immature Canadian market. The rationality encompassing this research is to sense

the possibility of tapping the monetary resource of a rising market through bright marketing techniques. The essential part of this study is to validate whether an amalgamation or an exclusive influence of information and sensory evaluation is necessary to support the claim made above. A discussion about the findings of this research study and its stance towards the stated hypotheses follows in the next section.

### *6.2 Conclusions*

The underlying hypotheses of this research study as stated in Chapter 4 are reiterated below:

**(a)** Stated purchase decisions for 60% organic whole wheat bread are price sensitive.

**(b)**The availability of additional information on health and environmental benefits about organic farming systems has a positive impact on the WTP for organic whole wheat bread.

**(c)** The combined effect of sensory evaluation and the provision of additional information types positively affects the respondents' WTP for organic whole wheat bread.

**(d)** Organic consumers are willing to pay more for the organic whole wheat bread.

**(e)** Certain demographic characteristics of respondents significantly affect their WTP.

**(f)** Respondent's pro-health concerns (attitudes) are better determinants of their willingness to pay premiums for the organic whole wheat bread than their pro-environmental concerns.

The logistic results state that the organic wheat bread is price sensitive due to its negative relationship with the dependent variable, WTP decision, and remains highly significant across all models. Additionally the calculated WTP values are also low, indicating a value placed by consumers' for the organic product. The results from the Turnbull estimator also back this finding as evidenced by the lower values associated with respect to the calculated lower and upper bounds of the E (WTP). We therefore do not reject the first null hypotheses that the 60% organic whole wheat bread is price sensitive.

Given the discussion of the results emerging from the logistic models presented in the last chapter, it is very clear that availability of information does influence the respondents' WTP decision. The sign of the dummy variable 'HINFO' capturing the influence of health information is significant at 10% level and carries a negative sign, indicating that if a respondent received health information the probability of him or her of paying for the organic wheat bread falls compared to if they had received environmental information. This result partially supports the second null hypothesis that both the information types have a significant and positive influence on the respondents' WTP decision. The Negative sign on the 'HINFO' variable may also be influenced by how the specific health information provided was viewed by our sample, which was on average younger than the general population. The health information about the benefits of organic farming used here predominantly focused on antioxidants. These antioxidants reduce the risk of cancer and heart diseases. Such information may resonate less with younger respondents who are less concerned with chronic diseases.

Model 'B' types were estimated to investigate the influence of sensory acceptance evaluation scores on the WTP decision of the respondents. The results

of these estimates suggest that only organic sensory evaluation in revealed (or labelled) scenarios, along with the differences in sensory scores between organic and conventional wheat bread samples in the labelled scenarios, were significant and increased the probability of the respondents' WTP for the organic product. The organic scores in the blind scenarios and the respective differences in sensory scores between the two bread samples were insignificant, implying that sensory evaluation in the revealed situations had a stronger impact on the respondents' WTP decision. It is also important to note that the respondents liked the organic wheat bread more in the blind scenarios than they did in the revealed scenarios as evidenced by their sensory rankings, although the former is insignificant in the regression analysis. The above facts emphasize the relevance of sensory evaluation as an important indictor while analyzing the demand or the choice of consumers with respect to organic products.

Since it was observed that the dummy variable 'O1'(order one) representing the ordering pattern incorporated in this study design was insignificant, an interaction variable involving both the order dummy and the health information dummy was generated to investigate their joint effect. This variable was found to be consistently significant across all the models plus carried a positive sign signaling a higher probability of the respondents' willingness to pay for the organic wheat bread. The probability of respondents being willing to purchase the organic bread sample increases with the presence of environmental information, but the respondents who received health information needed sensory acceptance evaluation under revealed conditions to respond positively. These findings support this study's third null hypotheses that there is a combined positive effect of sensory evaluation

along with the type of information provided on the WTP decision of the respondents.

Model 'C' was estimated to investigate whether the survey location influenced the stated purchase decision. These specifications indicate that the only significant place dummy was 'UOFA', carrying a negative sign, indicating that the respondents recruited from the University of Alberta campus generally were not as willing to purchase the organic wheat bread. The place dummy variable 'ORGSTORE' representing the part of data originating from organic specialty stores also a proxy for organic shoppers is insignificant but when interacted with the order one dummy (O1) reduces the probability of the respondents' willingness to purchase the organic wheat bread. The above finding guides this study to reject the fourth null hypotheses as the variable capturing the preference of regular organic shoppers suggest that they are not WTP for the organic wheat bread.

As reported earlier due to the process of filtering only three demographic variables were considered and estimated in this study's base model namely 'MALE, AGE and EDU7', where 'EDU7' represents a dummy for some postgraduate education. Only Male (gender) and possession of some postgraduate educational level were significant. A male respondent had a lower probability of being willing to purchase the wheat bread, whereas if he or she enjoyed a higher educational level, they were more inclined to pay for it. Hence, we do not reject the fifth null hypotheses.

The rationale for incorporating health and environment attitudes scales in this study's survey is to understand the respondents' attitudes and knowledge towards the above two issues prior to provision of additional information. The average values for the question scores were generated for each individual

respondent due to the high reliability of these scales, as evidenced by their large Cronbach's α values. Further the logistic regression results report that the variable representing the average health attitude scale is insignificant in all the models whereas the variable capturing the average environment attitude scales is highly significant in all the models and increases the respondents' probability of WTP for the 60% organic wheat bread. These findings are in line with the respondents' positive and negative response to the purchase decision question when additional information about environment and health benefits of organic farming system is provided. Hence the respondents' higher probability of WTP for the organic wheat bread when environment information about benefits of organic farming system was provided could be attributed to their pro-environment attitude. Their deep concern for environment as one of the driving factor to pay for the product is certified by its higher statistical significance over health attitude scales in the regression results.

The results are more intuitive if the respective attitude and information variables move in the same direction. The findings of this research study are synonymous to the findings by Whitehead *et al.* (1991) where information orderings and statements made in contingent markets affects the WTP decision of the respondents and help to negate overstatement or understatement of WTP. This finding contradicts the last stated hypothesis, as pro-environment attitudes are dominant in increasing the respondent's probability of WTP for the organic wheat bread.

### *6.3 Policy Recommendations*

This research finds that the major impediments for the market growth of this specific type of organic product are its relatively expensive nature to a similar conventional type and the lack of trust or faith amongst the respondents in general about the certification of the product due to its credence nature. It was also reported that the respondents are more likely to purchase the organic product if the environmental benefits about its farming system is made available, but not so when information on health benefits is provided. Respondents are more likely to pay for the organic wheat bread when health information is accompanied by revealed or labelled sensory evaluation unlike the individual effect of environment information. Since similar results are replicated with respect to the attitudes of respondents on the WTP decision, the retailers or organic producers should seek to promote the environmental benefits of organic production along with an improvement in the consumer's confidence with respect to their labels. The scores of sensory evaluation indicate that the respondents liked the organic wheat bread more under blind scenario than under revealed, indicating that they like the taste of organic bread but were possibly discouraged by its price when revealed. The sensory acceptance evaluation under revealed situation along with the joint effect of information and sensory evaluation increases the respondents' WTP for organic wheat bread, thus necessitating the use of intrinsic and extrinsic attributes about organic foods together to increase their marketability.

Stewart (2006) finds that the farmer's share of the retail price has dropped significantly over the past 20 years. Therefore a lower premium value for the

organic wheat bread similar to this research study indicates lesser amount accrued to the farmers as bulk of the premium amount disappears in to the marketing or retailing channels. Therefore organic production may be unpopular amongst farmers. Further the expected WTP values calculated by Turnbull and logistic regressions indicate lower premium values of $0.31 and $0.55 respectively. Whereas, the mean WTP value increases to $0.93 if the demographic factors and other factors are not controlled or absent. Consumers who are WTP a higher premium, it is these consumers that retailers or producers may wish to target in order to capture higher revenues for organic products.

### *6.4 Limitations and Future Recommendations*

This research study is an attempt to enunciate the joint use of different information types along with sensory evaluation under different scenarios on the respondents' WTP choice for 60% organic whole wheat bread, but carries with it certain limitations that should be addressed when incorporating similar techniques for future research. Firstly, this research uses cheap talk as technique to negate the possibility of hypothetical bias, but there have been past research works that have emphasized the use of experimental auction mechanism as a better substitute because it considers real goods and money (Gil *et al.,* 2000; Soler *et al.*, 2002). Future research aimed to capture the WTP for organically produced goods could adopt the above technique as a possible replacement by inducting innovative study designs.

Secondly, the results and suggestions of this research is purely based on the data collected from Edmonton and some parts of Red Deer and hence may not be readily generalized. The data concentration could have been more diversified with respect to location if additional research funds were available. Finally, the blind

sensory evaluation of the coded bread samples did not follow a random order when it was presented to the respondents, but instead followed a constant pattern universal to all.

There are two issues that should be addressed when performing future research studies that implement similar research designs. One concern with the present study is with the provision of health information. The content of health information in this study predominantly deals with antioxidants which help to reduce incidence of chronic diseases like heart attacks and cancer. This information may be ineffective if bulk of the respondents belong to a younger age group who are less sensitive to these information issues. Therefore, future research may look towards improvising its content.

The second issue area of improvement in the current study is a more detailed analysis with respect to calculating mean WTP values for different sub samples using both parametric and non-parametric estimation procedures. The reason being that WTP amounts could be diverse and may be influenced by specific factors like gender or income. It is inferred from the sample of this study that female respondents formed the majority and about 42 % of them were WTP for the organic bread. So by calculating the maximum, minimum and mean WTP for the respondents for a sub sample of only female respondents could project a higher WTP premium or interesting results. The above finding could also be replicated for respondents with different levels of education and for different age and income groups. The key inferences gained from such an analysis could facilitate sellers to target specific groups of customers through niche marketing techniques.

Despite these few drawbacks, this study provides results that are revealing, and hopefully quite useful given the limited amount of previous research on the infant Canadian organic market. This study introduces a distinct study design that enables the researcher to capture the effects of multiple factors, individually or in combination, on the consumers WTP for organic wheat bread.

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# Appendix

## *A: Description of Variables*

| Variable Name | Description |
|---|---|
| **Price premium (Price Bid)** | The seven different price premium of organic 60% whole wheat bread ranging between $0.25 and $3.25 spread across 400 survey using randomization technique. The reference price is $1.50 per loaf for the conventionally grown 60% whole wheat bread. |
| **Order one (O1)** | Dummy variable taking the value 1, if the questionnaire order is one that is when information type is followed by labelled taste evaluation and then the question on the WTP decision and "0" otherwise. Order 2 is the base case in which the WTP question precedes the revealed sensory acceptance evaluation. |
| **HealthInformation (HINFO)** | Dummy variable taking the value 1, if the respondents get Health information and zero otherwise. (The environment information is the base case). |
| **HSENSB** | This is the interaction between the variables HINFO and O1, and can be sequentially described as **Health Information → Revealed Sensory Evaluation → WTP.** |
| **MALE** | Dummy variable with value 1, if the respondent is male and zero otherwise. |
| **AGE** | All the mean values of the age categories specified on the survey. |
| **Post-Secondary Education (EDU 7)** | Dummy variable taking the value 1 if the respondent has post graduate University degree ( e.g. Master's or Ph.D.) and '0' otherwise. |
| **Health Attitude (AVGHEA)** | A dummy for environment attitude for each respondent. It equals '1', for those surveys where all seven environment attitude questions are rated as '4 or 5' else zero. |
| **Environment Attitude** | A dummy for health attitude for |

| | |
|---|---|
| (AVGENV) | each respondent. It equals '1', for those surveys where all five health attitude questions are rated as '4 or 5' else zero. |
| **Organic Labeled (ORGL)** | Ranking of 60% whole wheat organic bread on the nine point hedonic scale under labelled or revealed scenario. |
| **Blind Change (BLINDCHG)** | The difference in sensory ranking scores between organic and conventional bread samples under blind situation. |
| **Labelled Change (LABLCHG)** | The difference in sensory ranking scores between organic and conventional bread samples under blind situation. |
| **Others (OFFCAMP)** | A dummy that takes the value '1' if the survey data was collected from off campus venues and zero otherwise. |
| **Organic Speciality Stores (ORGSTORE)** | A dummy that takes the value '1' if the survey data was collected from a specialized organic store like bigfresh, organic roots etc and zero otherwise. |
| **Shopping Malls (MALLS)** | A dummy that takes the value '1' if the survey data was collected from a shopping mall and zero otherwise. |
| **Reddeer (REDEER)** | A dummy that takes the value '1' if the survey data was collected from the town Red Deer, Alberta and zero otherwise. |
| **University of Alberta (UOFA)** | A dummy that takes the value '1' if the survey data was collected from within the campus of University of Albert venues and zero otherwise. |
| **Interaction of organic consumers and Order one (O1OGS)** | It is a interaction between the dummy variables 'O1' and 'ORGSTORE'. |

***B: Consent Form for Consumer Panel Sensory Evaluation of Wheat Bread***

**Title of Research Project:**

Consumer Panel Sensory Evaluation of Wheat Bread

**Investigators:**

- Wendy Wismer, Department of Agricultural, Food and Nutritional Science, University of Alberta
- Lisa Annett, Department of Agricultural, Food and Nutritional Science, University of Alberta
- Peter Boxall, Department of Rural Economy, University of Alberta
- Sean Cash, Department of Rural Economy, University of Alberta.

**Consent:** Please circle your answers:

| | | |
|---|---|---|
| Do you understand that you have been asked to be in a research study? | Yes | No |
| Do you have any allergies, sensitivities or intolerances to the wheat bread ingredients:<br>▪ **Whole wheat flour**<br>▪ **Yeast**<br>▪ **Non-fat dried milk**<br>▪ **All-Vegetable Shortening**<br>▪ **Sugar**<br>▪ **Salt**<br>*If you have answered" yes", please stop and tell one of our staff immediately.* | Yes | No |
| Have you read and received a copy of the attached Information Sheet? | Yes | No |
| Do you understand the benefits and risks involved in taking part in this research study? | Yes | No |
| Have you had an opportunity to ask questions and discuss this study? | Yes | No |
| Do you understand that you can quit taking part in this study at any time while you are completing the questionnaire? You do not have to say why. | Yes | No |
| Has confidentiality been explained to you? | Yes | No |
| Do you understand who will have access to your data? | Yes | No |
| Do you know what the information will be used for? | Yes | No |
| Do you give your consent to use the data obtained in this experiment for the explained purpose of the study, outlined in the project information sheet? | Yes | No |
| Do you give consent for additional analysis of your data at a later date? | Yes | No |

**The persons who may be contacted about the research are:**

Wendy Wismer, University of Alberta, 780-492-2923
Lisa Annett, University of Alberta, 780-492-3833
Peter Boxall, University of Alberta, 780-492-5694
Sean Cash, University of Alberta, 780-492-4562

This study was explained to me by: _____

I agree to take part in this study.

_____ _____/_____/_____
Signature of Research Participant Date (dd/mm/yyyy)

_____
Printed Name

I believe that the person signing this form understands what is involved in the study and voluntarily agrees to participate.

_____
Signature of Investigator or Designee

**Summary of the research results:**

Would you like to receive a summary of the results of the consumer panel research? Yes No

If you answered "Yes" please fill in your e-mail address or postal address. Your contact information will not be used for any other reason than to provide you with a summary of the results.

E-mail OR Postal Address: _____

_____

*C: Project Information Sheet*

## Consumer Panel Sensory Evaluation of Wheat Bread

**Purpose:** The purpose of this project is to evaluate consumer liking of four samples of whole wheat bread and gather information about consumer wheat bread consumption, purchase habits and opinions of wheat grain production practices.

**Consumer Panel Methods**: You are being asked to participate in a consumer sensory panel to taste four samples of 60% whole wheat bread. There are two parts to this evaluation; Part A of the questionnaire with two samples of bread to evaluate followed by Part B of the questionnaire with two more samples of bread to evaluate. The session takes about 15-20 minutes.

**Confidentiality:** You are not asked to provide your name on any of the questionnaires. Your questionnaires will be given a participant number. The contact information you provide on the consent form will be used only to inform you of the outcome of the study if you have requested this information.

**Benefits:** The results of this study may not have any direct benefits for you. No payment is offered, however you will receive a $2.00 Tim Horton's gift certificate at the end of the session. The results from this study will be valuable to the wheat farmers of Alberta.

**Risks:** The risks of participating are no different from the normal risks associated with the consumption of wheat bread and water. The ingredients in the wheat bread are as follows:

- Whole wheat flour
- Yeast
- Non-fat dried milk
- All-Vegetable Shortening
- Salt
- Sugar

If you have any allergies, intolerances or sensitivities to these ingredients you should not participate.

**Withdrawal from the Study:** Even after you have agreed to participate in the consumer panel, you may withdraw from the panel at any time before or during the evaluations. The researchers will not use any evaluations you have completed to that point.

**Use of Your Information:** This study is being done by researchers in the Departments of Agricultural, Food and Nutritional Science and Rural Economy. Your consumer panel data will be averaged with those of the other participants and these mean values will be used to generate overall preferences for the wheat bread. The data will be used for a Master's Thesis and journal publication entailing the research study and results. If you want, a summary of the research results will be e-mailed or post-mailed to you. Only the researchers will have access to your data.

**For further information you can contact:**


| Wendy Wismer | Lisa Annett | Peter Boxall | Sean Cash |
|---|---|---|---|
| 492-2923 | 492-3833 | 492-5694 | 492-4562 |

wendy.wismer@ualberta.ca,lisa.annett@ualberta.ca,peter.boxall@ualberta.ca, scash@ualberta.ca

**For information about how this project is carried out you may contact:**
Georgie Jarvis
Research Ethics Board Administrator
2-14 Ag/For Centre, University of Alberta
492-8126
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*D: Survey Example*

## PART A: Information about yourself

Please answer the following questions about yourself by placing a check mark (√ ) in the box that best represents you:

1. On average, how often do you eat **whole wheat** bread (60%, 80% or 100% whole wheat) or **whole wheat** bread products (*e.g.* bagels, buns)?
   - ☐ 5 or more servings a day
   - ☐ 2-4 servings a day
   - ☐ One serving a day
   - ☐ 2-6 servings a week
   - ☐ Less then 2 servings a week
   - ☐ Never consume whole wheat bread or bread products

2. Where do you normally purchase your **bread and bread products**?

Please circle the number (1-4) that best represents your purchase of bread at the following stores.

| | Most Often | Sometimes | Rarely | Not at all |
|---|---|---|---|---|
| Supermarkets (e.g. Safeway, Sobeys, Superstore) | 1 | 2 | 3 | 4 |
| Organic or Natural section in Supermarket (e.g. Safeway, Sobeys, Superstore) | 1 | 2 | 3 | 4 |
| Specialty Food Stores or Bakeries (e.g. Bee Bell Bakery, Sunterra Markets) | 1 | 2 | 3 | 4 |
| Organic Grocery Stores | 1 | 2 | 3 | 4 |
| Farmer's Markets | 1 | 2 | 3 | 4 |
| Wholesalers (e.g.Costco) | 1 | 2 | 3 | 4 |
| Other: (Please specify)_____ | 1 | 2 | 3 | 4 |

3. I most often purchase bread that is a: (please check one)
   - ☐ **National Brand** (*e.g.* Dempster's, Wonderbread, Ovenjoy, Olafson, Healthy Way, etc)
   - ☐ **Store Brand** (*e.g.* Safeway, IGA, President's choice, Western Family, etc)
   - ☐ **Produced at a Specialty Bakery** (*e.g.* Bee-Bell, Buns&Roses, BonTon, Kinnikinnick Foods)

4. Please indicate your gender:

- ☐ Female
- ☐ Male

5. Please indicate the age group that you belong to:

- ☐ 18-24 years
- ☐ 25-34 years
- ☐ 35-44 years
- ☐ 45-54 years
- ☐ 55-64 years
- ☐ 65-74 years
- ☐ 75 plus years

6. Please indicate the level of education that corresponds to what you have completed:

- ☐ Some high school
- ☐ High school graduate
- ☐ Some university or college
- ☐ College diploma/degree
- ☐ University undergraduate degree
- ☐ Some post graduate university study
- ☐ Post graduate university degree (*e.g.* Master's or Ph.D.)

7. Please indicate the range that represents your household income level in the year 2004, before taxes:

- ☐ Less than $36,600
- ☐ $36,601- $71,000
- ☐ $71,001 - $115,000
- ☐ More than $115,001

8. Are you a member, or do you participate in, an environmental organization?(such as Ducks Unlimited, ECOS, Green Communities Edmonton Association, Environmental Direct Action Network, Friends of Elk Island Society etc.)

- ☐ Yes
- ☐ No

## Part A: Taste Evaluation of Wheat Bread

**Please take a sip of water to rinse before beginning the evaluation.**

Please evaluate the two bread samples.

1. Look at the appearance of the bread sample.
2. Open the bag and take the sample out of the bag
3. Smell the aroma of the bread sample
4. Taste the bread sample

For each sample, rate your **overall opinion** on the scales below by placing a check mark (√ ) in the box that best represents your opinion.

### Sample: 762

Please rate your overall opinion.

| ☐ Dislike Extremely | ☐ Dislike Very Much | ☐ Dislike Moderately | ☐ Dislike Slightly | ☐ Neither Like nor Dislike | ☐ Like Slightly | ☐ Like Moderately | ☐ Like Very Much | ☐ Like Extremely |
|---|---|---|---|---|---|---|---|---|

Please add any comments you may have about bread sample **762**:

_____

_____

**Please take a sip of water to rinse your mouth before evaluating the second sample.**

### Sample: 185

Please rate your overall opinion.

| ☐ Dislike Extremely | ☐ Dislike Very Much | ☐ Dislike Moderately | ☐ Dislike Slightly | ☐ Neither Like nor Dislike | ☐ Like Slightly | ☐ Like Moderately | ☐ Like Very Much | ☐ Like Extremely |
|---|---|---|---|---|---|---|---|---|

Please add any comments you may have about bread sample **185**:

_____

_____

## Part A: Your Opinions on Food and Related issues

Please answer the following questions about your views on health. Please circle the number (1-5) that best represents your opinion.

| | | Not At All | Not Very Much | Somewhat | Very Much | A Lot |
|---|---|---|---|---|---|---|
| 1 | How much of an effect do you feel what you eat will have on your future health? | 1 | 2 | 3 | 4 | 5 |
| 2 | To what extent do you feel your health depends on how you take care of yourself | 1 | 2 | 3 | 4 | 5 |
| 3 | Some people feel that if they are going to be sick, they will be. How much do you feel it is possible to prevent sickness? | 1 | 2 | 3 | 4 | 5 |
| 4 | If qualified health professionals recommend eating certain foods, how likely are you to try them? | 1 | 2 | 3 | 4 | 5 |
| 5 | How much more are you concerned about what you eat then you used to be? | 1 | 2 | 3 | 4 | 5 |

Please answer the following questions about your views on the environment. Please circle the number (1-5) that best represents your opinion.

| | | Strongly Disagree | Somewhat Disagree | Neither Agree or Disagree | Somewhat Agree | Strongly Agree |
|---|---|---|---|---|---|---|
| 1 | It makes me sad to see natural environments destroyed | 1 | 2 | 3 | 4 | 5 |
| 2 | Unique environments should be protected at all costs. | 1 | 2 | 3 | 4 | 5 |
| 3 | One of the most important reasons to conserve is to preserve wild areas | 1 | 2 | 3 | 4 | 5 |
| 4 | Wild plants and animals have a right to live unmolested by humans | 1 | 2 | 3 | 4 | 5 |
| 5 | We must prevent any type of animal from becoming extinct, even if it means sacrificing some things for ourselves. | 1 | 2 | 3 | 4 | 5 |
| 6 | I am willing to make personal sacrifices for the sake of slowing down pollution even though the immediate results may not seem significant | 1 | 2 | 3 | 4 | 5 |
| 7 | Natural ecosystems have a right to exist for their own sake, regardless of human concerns and uses. | 1 | 2 | 3 | 4 | 5 |

**Thank you for completing the first part of the consumer questionnaire. Please let us know when you are ready for the second part.**

## PART B: Consumer Information

Please read the following information about organic farming practices.

**Health Information: (H1 and H2)**

Fruits, vegetables and grains grown under organic farming practices tend to contain higher levels of antioxidants compared to their conventional counterparts. According to recent research, a high antioxidant intake has been associated with a lower incidence of heart disease and some cancers.

Antioxidants are naturally made by a plant when it is attacked by insects. The National Standards of Canada for Organic Agriculture prohibit the use of most synthetic pesticides and fertilizers on crops and soil. Since pesticides are not allowed, the plants produce more antioxidants to discourage insects. This also results in fewer synthetic chemical residues in food.

Organic food products may also contain fewer food additives. For example, in the United Kingdom, the UK Food Standards Agency restricts certain ingredients and additives in processed organic foods such as:

- artificial colorings and artificial sweeteners
- MSG (monosodium glutamate)
- Hydrogenated fats

In each case their use has been restricted because of evidence that they may be damaging to health.

## PART B: Consumer Information

Please read the following information about organic farming practices.

**Environmental Information: (E1 and E2)**

The basic idea of organic food production is to ensure that the organic farm is sustainable and operates in a manner harmonious with the environment. Voluntary guidelines for organic agriculture have been set up by the Canadian General Standards Board. They recommend that organic farmers:

- Protect the environment
- Minimize soil degradation and erosion
- Decrease pollution
- Optimize biological productivity
- Promote a sound state of human, animal and environmental health
- Recycle materials and resources when possible
- Maintain the integrity of organic foods and processed products from initial handling to point of sale

The National Standards of Canada for Organic Agriculture prohibit the use of most synthetic pesticides and fertilizers on crops and soil. This results in less harm to the environment. Organic farmers must use other management methods and selected varieties to prevent diseases and resist pests.

## Part B: Taste Evaluation of Wheat Bread

**Please take a sip of water to rinse before beginning the evaluation.**
Please evaluate the two bread samples.

5. Look at the appearance of the bread sample.
6. Open the bag and take the sample out of the bag
7. Smell the aroma of the bread sample

Taste the bread sample

For each sample, rate your **overall opinion** on the scales below by placing a check mark (√ ) in the box that best represents your opinion.

### "Organic" Sample: Bread made with flour from organically grown wheat.

Please rate your overall opinion.

| ☐ Dislike Extremely | ☐ Dislike Very Much | ☐ Dislike Moderately | ☐ Dislike Slightly | ☐ Neither Like nor Dislike | ☐ Like Slightly | ☐ Like Moderately | ☐ Like Very Much | ☐ Like Extremely |
|---|---|---|---|---|---|---|---|---|

Please add any comments you may have about the bread made from organically grown wheat:

_____

_____

**Please take a sip of water to rinse before evaluating the second sample.**

### "Conventional" Sample: Bread made with flour from conventionally grown wheat

Please rate your overall opinion.

| ☐ Dislike Extremely | ☐ Dislike Very Much | ☐ Dislike Moderately | ☐ Dislike Slightly | ☐ Neither Like nor Dislike | ☐ Like Slightly | ☐ Like Moderately | ☐ Like Very Much | ☐ Like Extremely |
|---|---|---|---|---|---|---|---|---|

Please add any comments you may have about the bread made from conventionally grown wheat:

_____

_____

## Part B: Purchasing Organic Bread Products

Please answer the following questions about yourself by placing a check mark (√ ) in the box that best represents you:

2. Recall that the information provided earlier suggested that organic farming practices do not involve the use of synthetic fertilizers or pesticides. Due to lower yielding crops and more weeds, there are greater labour inputs per unit of output required for organic production. For these reasons, organic products can be more expensive.

   *We are about to ask you if you would purchase an organic product at a certain price. Previous surveys of this nature find that the amount of money people SAY they are willing to pay is sometimes higher than the amount they would ACTUALLY pay for this product. For this reason, as you read the following question, please imagine that you would ACTUALLY have to pay this amount keeping in mind what you normally pay for groceries for you and your family.*

   Assume that the cost of conventional bread on average is $1.50/loaf at the store where you usually shop. On your next shopping trip assume you need to buy one loaf of bread. If organic bread were available for purchase, would you purchase this organic bread if it cost range ($0.25 to $3.25)/ loaf more than the conventional product, in other words if the total price of the organic bread was range ($1.75 to $4.75)/ loaf?

   Yes ☐ No ☐

3. If you answered "yes" to the question above, how certain are you of your answer?

| Very Certain | Somewhat Certain | Unsure | Somewhat Uncertain | Very Uncertain |
|---|---|---|---|---|
| ☐ | ☐ | ☐ | ☐ | ☐ |

   If you answered "NO" to question 1, would you buy this loaf of organic bread if the price was the same as the average price of conventional bread?

   Yes ☐ No ☐

3. On average, how often do you eat **ORGANIC whole wheat bread** (60%, 80% or 100% whole wheat) or **ORGANIC whole wheat bread** products (e.g. bagels, buns etc)?
   - ☐ 5 or more servings a day
   - ☐ 2-4 servings a day
   - ☐ One serving a day
   - ☐ 2-6 servings a week
   - ☐ Less then 2 servings a week
   - ☐ Never consume organic whole wheat bread or bread products

4. How often do you purchase **organic foods**?
   - ☐ I only buy organic foods
   - ☐ I frequently buy organic foods
   - ☐ I sometimes buy organic foods
   - ☐ I rarely buy organic foods
   - ☐ I never buy organic foods

5. If you do purchase organic foods, **what types of organic foods** do you buy? (check all that apply)
   - ☐ Milk or dairy products
   - ☐ Vegetables
   - ☐ Fruit
   - ☐ Meat, fish, or meat products
   - ☐ Bread or bread products
   - ☐ Pre-prepared products (eg. Canned soup)
   - ☐ Other: (Please specify)_____

6. What are some reasons that may **prevent you** from purchasing **organic foods**? (check all that apply)
   - ☐ Organic foods are too expensive
   - ☐ Organic foods are not available where I shop
   - ☐ The quality of organic foods is poor
   - ☐ I have limited knowledge about organic products
   - ☐ I do not trust the source of organic products
   - ☐ Other (please specify) _____

**Thank you for completing the second part of the consumer questionnaire.**
**Please let us know when you are finished.**