Improving the Marketability of Horticultural Products: Communicating to the Consumer

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Dedication

This thesis is dedicated in memory of my great aunt Bertha (Betty) Lewis who received her Ph.D. in chemistry from the UMN in 1957 and who inspired me to be interested in science at a young age. I also want to dedicate this thesis in memory of Burnetta Reckard who always enjoyed gardening and shared that love with her grandchildren.

Abstract

Consumers are very heterogeneous and it is challenging to determine specific product attributes that impact their purchasing choices. To investigate consumer behavior regarding horticultural products, I conducted two experiments: 1) Consumers preferences for longevity information and guarantees on cut flower arrangements, and 2) Does visual attention to product attributes on minimally processed horticultural products impact consumers' preferences?

For the cut flower arrangement study an internet choice experiment was conducted in 2011. Significant variation was found in consumers' willingness to pay (WTP) for differing longevity lengths and guarantees. Specifically, participants were more likely to select and pay premiums for cut flower arrangements with longer vase life longevity and a guarantee. Using Ward's linkage cluster analysis, three distinct consumer clusters were developed: guarantee seekers, value conscious consumers, and spenders. Forty-nine percent of participants were guarantee seekers, 31% were value conscious consumers, and 20% were spenders. Guarantee seekers preferred guarantees on the cut flower arrangements. Value conscious consumers were interested in both guarantees and longevity indicators. Spenders were the least interested in longevity indicators and guarantees. We conclude floral retailers could use longevity indicators and guarantees to attract consumers, improve consumer confidence, and generate profits. Floral retailers could also develop target marketing strategies to attract different consumer clusters.

In the minimally processed horticultural products study, an experimental auction and eye-tracking analysis were combined to examine consumer preferences and WTP. Differences were found between production methods, origin, and nutrient content claim content. Consumers' preferences and WTP were product specific. Additionally, there was a correlation between visual attention and consumers' WTP. More fixations on attributes participants' valued resulted in greater WTP. Conversely, more fixations on attributes participants' did not value resulted in a discounted WTP. We conclude producers and industry associations could benefit from exploring the potential of producing products with the attributes commanding greater premiums. Additionally, retailers could benefit from using in-store promotions to improve the visibility of the premium generating attributes.

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CHAPTER 1: Introduction

Due to increased availability of product options and consumer knowledge, consumers are becoming increasingly discerning when selecting products. As a result, competition among firms to gain consumers' attention is increasing. Firms need to differentiate their products in order to attract consumers during the purchase decision-making process. Often firms use point of purchase materials to differentiate their products.

Point of purchase materials (e.g. in-store signage, labels, displays, and so on) are used to communicate directly to consumers in the retail setting. They provide additional information about the products and influence which product(s) the consumer purchases (Kahn and Wansink, 2004). For example, Wansink, Painter and van Ittersum (2001) demonstrate that descriptive labels increase sales by 27%. Positive associations with descriptive words improve consumers' perceptions and level of satisfaction with the product and retail store (Wansink et al., 2001).

Using point of purchase materials to differentiate products is very important because consumers are exposed to many substitute products. In 2012, the average supermarket carried 42,686 products (Food Market Institute, 2013). With so many choices, product information at the point of purchase can convey quality cues and expectations to consumers (Areni et al., 1999; Brunso et al., 2002).

In horticulture, understanding what horticultural product components consumers notice and how that information impacts their purchasing decisions is essential. Past research has focused on eco-labeling (Yue et al., 2009b), biodegradable packaging (Hall

et al., 2010), genetically modified foods (James and Burton, 2003), country of origin labeling on fresh products (Kloeckner et al., 2010), and so on. The following chapters investigate the impact of product information on consumer behavior and willingness to pay (WTP) for various horticultural products. Here we will review consumer behavior, choice experiments, experimental auctions, utility theory, eye-tracking, and project objectives.

Consumer Behavior

Consumer behavior research is essential in understanding what drives consumers' choices. However, consumer behavior research is challenging because any factors impact consumers' actions. Internal influences (perception, motivation, learning, attitudes, personality, age groups, and lifestyle), social influences (culture, subculture, social class, and group memberships), and situational influences (physical environment and time) are all factors that affect consumer behavior, the decision making process, and what product(s) the consumer purchases (Solomon and Stuart, 2003).

Consumers go through five steps when they make purchasing decisions (Solomon and Stuart, 2003; Figure 1.1). In step 1 - problem recognition, the consumer realizes s/he has an unmet need or want. Next, in step 2 - information acquisition, consumers actively seek out information about options to fulfill that need or want. In step 3 - evaluation of alternatives, the consumer evaluates the advantages and disadvantages of the alternative product options. Then, in step 4 - product selection, the consumer selects a product that provides him/her with the most benefits. Last, in step 5 - post-purchase evaluation, the

consumer determines if his/her expectations were met and s/he is satisfied or if his/her expectations were not met and s/he is dissatisfied.

Consumers' preexisting expectations impact their level of satisfaction. For instance, if a consumer expects a cut flower to last 10 days and it only lasts 5 days, s/he will be disappointed. Consequently, s/he may not purchase that type of cut flower again or cut flowers in general. Internal expectations can be created through past experiences, promotions, advertising, and other communications (Solomon and Stuart, 2003).

Overall, product information impacts which product is purchased. Therefore, communicating relevant information to consumers is important in aiding them in making their purchasing decisions (Kahn and Wansink, 2004). Consumer behavior research helps to identify what information and attributes have positive impacts and what features are unimportant.

Due to consumers having many options and substitutes available, researching consumer behavior is challenging. Many variables influence consumers and many of them are not readily apparent (e.g. internal and social influences). The two most popular methods of studying consumer behavior are choice experiments and experimental auctions. Both methods are a means of measuring heterogeneity among consumers and their value for different products and attributes.

Choice Experiments

Choice experiments are a preferred research technique in consumer behavior studies. In choice experiments, participants are given several options and asked to select their preferred alternative. The alternatives have predefined attributes and attribute

levels. Researchers can then determine the relative importance of the different attributes and generate WTP estimates. In the past, choice experiments have been used to extensively investigate consumer preferences for a variety of products with different attributes such as organic production methods (Yue et al., 2007) and genetically modified organisms (Burton and Pearse, 2002; James and Burton, 2003).

Choice experiments offer several benefits to consumer behavior research. The use of choice experiments allows for the analysis of consumer purchases, provides the opportunity to simultaneous investigate a number of product attributes, gives insights to the relative importance of product attributes to consumers, defines product quality on the consumer's level, and gives insights to the industry to adjust marketing strategies (Gaasbeek and Bouwman, 1991). Additionally, choice experiments are flexible and let researchers create a market where the participant selects a product to purchase (Lusk and Shogren, 2007).

Experimental Auctions

Experimental auctions are often used in consumer and marketing research to reduce hypothetical bias. Hypothetical bias occurs when participants' behavior deviates from their stated preferences. Experimental auctions create an environment which encourages participants to select their "true" preferences for different products and product attributes (Vickrey, 1961).

In an experimental auction, participants bid on products with predetermined attribute levels. The participant who bids the highest amount wins the auction. However, unlike a traditional auction, s/he does not pay what s/he bid but instead pays a price (the

market price) that is exogenously determined from his/her bid. The market price is often selected from a randomly determined set of prices. After the experimental auction, consumer preferences for the product and product attributes are determined by comparing participants' bids to bids for a pre-existing substitute or by directly eliciting bids to exchange a pre-existing substitute for that good.

It is imperative that the price is determined independently of the participant's bid. If the participant bids more than s/he is willing to pay, s/he risks paying more for the item. Conversely, if the participant bids less than s/he is willing to pay, s/he risks not winning the item. Consequently, bidding his/her true value for the item results in utility maximization (Lusk and Shogren, 2007).

One advantage of using experimental auctions in market research is that they reduce/eliminate hypothetical bias by creating an environment where there is an incentive to truthfully reveal preferences due to real economic consequence. As a result, if participants deviate from their true willingness to pay they risk over paying for a product or miss the opportunity to own the product. Another advantage of using experimental auctions is that researchers have control over the environment to reduce external forces (Lusk and Shogren, 2007). Researchers can then provide contextual cues and measure the impact on participants' bids (Lusk and Shogren, 2007). Ultimately, experimental auctions give researchers each individual's preferences for products and "provide the richest description of heterogeneity in valuations across people and goods with minimal assumptions" (Lusk and Shogren, 2007). In the past, experimental auctions have been used to elicit value and determine consumer preferences for a variety of horticultural products (Mabiso et al., 2005; Hall et al., 2010).

Utility Theory

All products consist of more than one characteristic and some products have overlapping characteristics. All of the product's characteristics influence the consumer's choice and it is important to measure their impact. As a result, utility measurements are used in consumer behavior studies to better understand why consumers select certain products and not others.

Choice experiments and experimental auctions measure consumers' underlying utility or satisfaction with the product(s) or attribute(s). Utility includes all of the benefits the consumer would realize if s/he purchased the product. Consumers select the product that offers the best set of attributes (Kahn and Wansink, 2004). In essence, the consumer knows what attributes provide them with the most underlying utility/satisfaction however the researcher does not. Lancaster's theory of consumer behavior states utility is not derived from a product but rather from the attribute composition of that product (Lancaster, 1966). Consequently, utility ranks a product's characteristics not the product itself, although products can then be ranked based on the characteristics they possess (Lancaster, 1966). For instance, a cut flower arrangement provides utility through experiential (fragrance, touch, etc.), aesthetic (color, shape, size, style), and (potentially) value-added characteristics (organic, local, delivery, guarantee) which impact the consumers' utility of that arrangement.

Utility measurements also provide insights into what product attributes provide consumers with the most utility. In choice experiments, utility is maximized when participants select the product(s) that provide them with the most benefits (Lusk and

Shogren, 2007). In experimental auctions, utility is maximized when the participants submit bids that coincide with their real values for the products (Lusk and Shogren, 2007). In the end, these methods give researchers a glimpse of how different products and attributes impact consumer behavior. They can also assist in directing future marketing and product development strategies.

Eye-tracking

A third technique to study consumer behavior is eye-tracking analysis. Eye-tracking analysis is a valuable research tool used to identify important attributes to consumers because consumers use visual cues to acquire product information while making purchasing decisions (Bix et al., 2009; Horstmann et al., 2009). Marketing researchers use eye-tracking to study visual stimuli that attract consumers' attention (Duchowski, 2007). Knowing what visual stimuli influences consumers is important because visual attention is the primary means of information acquisition during the decision making process. Additionally, not all information is used in the decision making process. The human brain has evolved visual search mechanisms to focus on important information while suppressing unimportant information (Pieters and Wedel, 2007). As a result, only 8% of the visual field is projected into the brain for processing (Pieters and Wedel, 2007). Therefore, determining what information is viewed, processed, and used by consumers and what information is inconsequential is difficult.

In order to understand how eye-tracking works it is important to have knowledge of how human sight operates. When humans are exposed to visual stimuli, the lens of the eye projects light on the retina (Tobii, 2013; PositScience, 2013). A special area of

the retina (called the fovea) contains photoreceptor cells (rods and cones) which help clarify the picture (Tobii, 2013). Information is then passed through the optic nerve to the brain for analysis. Visual information acquisition occurs very quickly. For instance, in normal lighting, a typical human can see a word and understand it within 50-60 ms (Tobii, 2013).

Eye movements include fixations (when the eye stops and fixates on the stimuli) and saccades (when the eye is moving between fixations). Information acquisition occurs during eye fixations (Pieters et al., 2002; Reutskaja et al. 2011) but not during saccades (Rayner, 1998). Fixations indicate visual processing and attention (Pieters and Wedel, 2007). Consumers fixate more frequently and for a greater amount of time on informative, difficult to understand, and/or important information (Ares et al., 2013; Bialkova and van Trijp, 2011; Loftus and Mackworth, 1978; Mackworth and Morandi, 1967; Meissner and Decker, 2010; Pieters and Warlop, 1999; Wedel and Pieters, 2000; Wedel et al., 2008). Fixations also indicate consumers are processing information or making a decision (Horstmann et al., 2009; Jacob and Karn, 2003; Velichkovsky et al, 2002). Land et al. (1999) found fixation counts are correlated with components of a task, which indicates task impacts visual search behavior. Consequently, measuring eye fixations while consumers are completing a specific task may help in deciphering what visual stimulus impacts their behavior.

Eye-tracking cameras are a non-invasive means of measuring eye movements (Maughan et al., 2007). An infrared camera is mounted on the front of a computer screen. As images are played across the screen the camera records the direction of the participant's gaze by using an infrared light source to reflect off the cornea and pupil.

The camera then determines the participant's gaze through triangulation of the distance and angles. The cameras can either illuminate the pupil (bright pupil) meaning the light is closer to the optical axis and causes the pupil to light up (similar to red eyes in photos) (Tobii, 2013). Or the camera uses dark pupil eye-tracking where the light is farther away making the pupil darker (Tobii, 2013). The Tobii 1X Light Eye Tracker (used in Chapter 3) uses both bright pupil and dark pupil methods to record eye movements (Tobii, 2013). Having both illumination options is desirable because each works better for different types of eyes. Using both methods improves the probability of recording more participants' eye movements.

Ultimately, visual attention impacts product selection (Pieters and Wedel, 2007). Past research suggests that the information observed through eye movements is strongly correlated with attention to product information (Pieters and Wedel, 2007; Maughan et al., 2007). The use of eye-tracking technology to pinpoint consumers' information acquisition behavior as they make their purchasing decisions has potential to provide invaluable insights into the consumer decision making processes.

Objectives

I conducted two studies using choice experiments, experimental auctions and eye-tracking. In the first essay *Consumers preferences for longevity information and guarantees on cut flower arrangements* I used a choice experiment to determine consumer preferences and WTP for cut flower longevity information and guarantees. Specifically, I tested three hypotheses, including:

1. Given the same flower type and the same longevity, consumer preferences are not impacted by longevity guarantees on cut flowers;
2. Given the same flower type, there is no difference between consumer preferences for cut flowers with longer vase life or shorter vase life;
3. Different consumer segments in terms of consumer preferences for cut flower longevities and longevity guarantees do not exist.

In the second essay *Does visual attention to product attributes on minimally processed horticultural products impact consumer preferences?* I utilized experimental auctions and eye-tracking technology to determine consumers' WTP for production methods, country of origin, and nutrient content claims on edible, processed horticultural products. Specifically, I tested five hypotheses, including:

1. Given the same type of product, there is no difference between participants' WTP for organically produced and processed products when compared to conventional products;
2. Given the same type of product, there is no difference between participants' WTP for organic and "all natural" products;
3. Given the same type of product, there is no difference between participants' WTP for local and domestic products when compared to imported products;
4. If a NCC is present, participants are not willing to pay a premium for the product;
5. And, greater visual attention to production methods, product origins, and NCC will not impact participants' WTP bids for the products.

Through these studies I hope to address how different information impacts consumers' purchasing behavior, valuation of products, and visibility. Ultimately, my research has potential to give insights on different product attributes that impact demand for horticultural products.

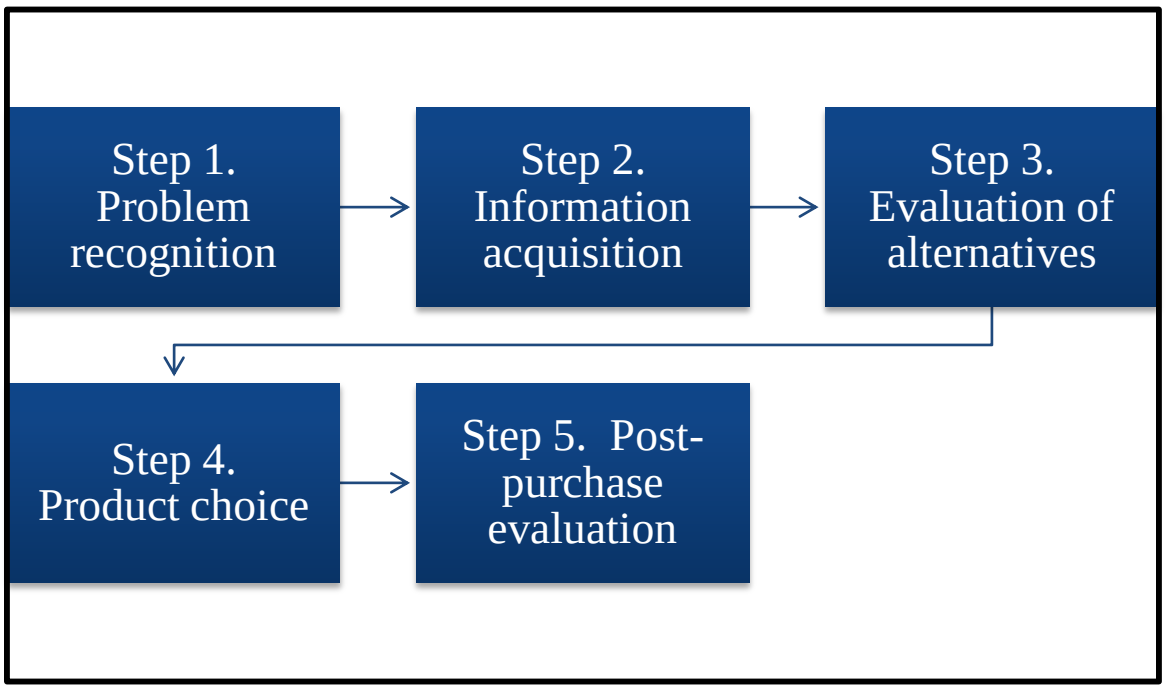

Figure 1.1. Diagrammatic representation of the five steps in the consumer decision making process

Consumer Preferences for Longevity Information and Guarantees on Cut Flower Arrangements [1]

Choice experiments were conducted to explore the market potential or value-added when using longevity information and guarantees on cut flower arrangements in the retail setting. The objective of our study was to determine consumer preferences and willingness to pay for different vase life longevities and guarantees on cut flower arrangements. Choice experiment data was collected using online surveys with 525 U.S. consumers in July, 2011, with choice experiment scenarios including cut flower arrangements with varying vase life longevities (5-7 days, 8-10 days, 11-14 days), guarantees (vase life longevity was or was not guaranteed), uses (self versus gift), and prices ($7.99-11.99, $34.99-43.99). Mixed arrangements composed of different species of cut flowers and single species arrangements consisting of six red roses plus a filler flower and greenery were included in this study. A mixed logit model and Ward's linkage cluster analysis were used to analyze the data. Participants were willing to pay higher prices for cut flower arrangements with longer vase life longevity. The presence of guarantees improved participants' probability of selecting the corresponding cut flower arrangements. Using Ward's linkage cluster analysis, we found there were three distinct consumer clusters: guarantee seekers, value conscious consumers, and spenders. Forty-nine percent of participants were guarantee seekers, 31% were value conscious consumers, and 20% were spenders. Among the three clusters, guarantee seekers were more likely to select flowers with guarantees. Value conscious consumers were interested in both guarantees and longevity indicators. Spenders were least interested in

[1] Manuscript is intended for publication in *HortScience*.

longevity indicators and guarantees. We conclude floral retailers could use longevity indicators and guarantees to increase consumer interest in cut flowers and generate profits. Target marketing strategies could then be developed by floral retailers to attract different consumer clusters.

Introduction

Fresh cut flowers have been an important part of our society since Ancient Greece and continue to be enjoyed for their aesthetics on numerous holidays, as gifts, and on other occasions (King, 2007). Cut flowers are also important to the U.S. economy. In 2012, the U.S. gross market value (sales volume) of wholesale fresh cut flowers was $11.7 billion (Society of American Florists, 2013). Bonarriva et al. (2003) concluded U.S. cut flower markets are attractive to international growers who produce cut flowers at lower costs when compared to domestic growers. Lower wage rates, less climate control investments, and weaker currencies contribute to lower production costs for international growers (Bonarriva et al., 2003). Consequently, in 2012, 64% of U.S. cut flowers were imported (Society of American Florists, 2013). Ninety-three percent of the 2012 cut flower imports came from Ecuador and Colombia (Society of American Florists, 2013). Due to the highly perishable nature of cut flowers, the time spent in transit and transportation conditions adversely affect cut flower postharvest vase life (Dole and Wilkins, 1999).

The highly perishable nature of cut flowers amplifies the importance of postharvest vase life management to all supply chain members (breeders, growers, producers, distributors, brokers, wholesalers, retailers and consumers; Drew et al., 2010). Short vase life is a primary purchasing barrier for consumers because it decreases consumer satisfaction and reduces perceived value (Ozzambak et al., 2009; Society of American Florists, 2005a). Dissatisfaction discourages consumers from making repeat purchases (Rihn et al., 2011). Yue et al. (2009a) concluded greater longevity positively impacts Generation X and Y consumers' purchasing decisions and longevity is a key

product characteristic of cut flowers. To date, few studies have investigated consumers' expectations for cut flower longevity or their willingness to pay (WTP) for cut flowers with longer vase life.

Unlike flower color or form, cut flower longevity is not readily apparent when consumers shop for cut flowers. As a result, consumers try to estimate cut flower longevities while shopping (Jowkar et al., 2007; Smith, 1968). Consumers use their longevity estimates as their internal reference points to determine their post-purchase satisfaction. If the postharvest longevity is less than the internal reference point, the consumer is dissatisfied. Dissatisfaction decreases the consumers' possibility of repurchasing the products (Dennis et al., 2004). Jowkar et al. (2007) found consumers could not accurately estimate how long cut flowers last. However, conflicting conclusions were drawn by Smith (1968) who found consumers are fairly accurate in predicting vase life. Yue et al. (2009a) suggested that familiarity with cut flowers increases estimation accuracy for the longevity of cut flowers. These studies lead to the hypothesis that the use of longevity indicators might have potential to mitigate consumers' incorrect estimations by providing them with more accurate information about the longevities of cut flowers. As a result, consumers' satisfaction may be improved by assisting them in creating more accurate expectations.

Cut flowers in the U.S. continue to be popular home decor and gift items (Society of American Florists, 2005b). In 2004, 67% of U.S. cut flowers were purchased as gifts (Society of American Florists, 2005b). Behe et al. (1992) and Huang (2005) determined that having purchased a floral gift in the past positively affected consumers' frequency of any floral purchase. However, studies have found gifts are perceived as riskier than non-

gift items because a badly chosen gift harms the relationship between the gift giver and recipient (Roster, 2006). Yue et al. (2009a) found that cut flower gifts are perceived as riskier than cut flowers purchased for personal enjoyment or as décor items. Therefore, due to increased risk with floral gifts, cut flower use may impact the importance of safeguards, such as longevity indicators and guarantees.

Guarantees may also impact consumer perceptions and preferences. Guarantees decrease consumers' perceived risk, minimize consumers' purchasing regret, and improve consumers' perceptions of product quality for potted plants (Dennis et al., 2004; Ortony et al., 1988). Consumers expect retailers to provide guarantees on rooted plants due to anticipating the rooted plants having greater life spans (Behe and Barton, 2000). Past research demonstrates how guarantees on rooted plants increases consumer satisfaction and perceptions of rooted floral products.

The benefits of guarantees may extend to shorter lived cut flowers. Rihn et al. (2011) suggested using cut flower guarantees to reduce perceived risks and improve consumers' experiences with floral products. However, Dennis et al. (2003) found a guarantee on Valentine's Day roses did not impact purchasing decisions. Consumers were also unaware of guarantee offerings in floral retail outlets (Dennis et al., 2003). The study conducted by Dennis et al. (2003) was for a specific occasion (Valentine's Day). The impact of guarantees on consumers' cut flower purchases in general (on all occasions) and their WTP for cut flower guarantees remains unknown.

In this study, choice experiments were used to determine consumers' preferences for longevity length estimates and the presence/absence of guarantees on cut flower arrangements. The advantages of using choice experiments include flexibility (in terms

of experimental design and number of attributes), the ability to gain information on consumer purchasing behavior, and the capability of identifying the relative importance of product attributes to consumers (Lusk and Shogren, 2007). In the past, choice experiments have been extensively used to determine consumers' preferences and WTP for different horticulture products and product attributes (Chung and Vickers, 2007; James et al., 2009; Yue et al., 2007).

In addition to choice experiments, consumer segmentation has been used to research and target specific subgroups of consumers (Oppenheim, 2000). Specifically, Ward's linkage cluster analysis has been used to identify consumer groups based on consumer behavior and socio-demographic variables (Lessig and Tollefson, 1971; Zarantonello and Schmitt, 2010). Specific marketing efforts can then be developed to target these subgroups and marketers can more efficiently allocate their marketing dollars to attract more profitable segments.

In our study, we focus on current cut flower consumers because retaining existing customers requires less time and financial resources than acquiring new customers (Schiffman and Kanuk, 2007). The overall objective was to explore consumer preferences and WTP for cut flower arrangements with varying vase life longevity and the presence/absence of a guarantee. Specifically, we tested three hypotheses:

1. Given the same flower type and the same longevity, consumer preferences are not impacted by longevity guarantees on cut flowers;
2. Given the same flower type, there is no difference between consumer preferences for cut flowers with longer vase life or shorter vase life;

3. Different consumer segments in terms of consumer preferences for cut flower longevities and longevity guarantees do not exist.

Our findings could assist florists, floral retailers, floral producers, and other industry stakeholders in determining how much value different consumers place on the use of longevity indicators and/or guarantees.

Materials and Methods

Our experiment consisted of three parts: prestudy focus groups, choice experiments, and a survey questionnaire. The study instruments and protocols were reviewed by the University of Minnesota Institutional Review Board (IRB) and were deemed exempt from review under federal guidelines 45 CFR Part 46.101 (b) category #2 (#1104E98416; Appendix A).

Prestudy focus groups. In order to develop the formal questionnaire, two prestudy focus groups were conducted in St. Paul, Minnesota. For each focus group, a random number generator was used to recruit ten participants from an email list of past study participants from the surrounding communities. Focus group participants were asked the screening question "Have you purchased or received cut flowers in the past 12 months?" to ensure that they had received or purchased cut flowers recently. Each participant was compensated $30 for their time. Participants were asked open-ended questions including: "How would you react to cut flower longevity claims? Would these claims influence your purchasing decision? How would you react to cut flower guarantees? What type of cut flower guarantees would interest you? What are your concerns about

cut flower longevity? What are your concerns about cut flower guarantees?" Answers to these questions were then used to develop the formal survey questionnaire.

Experiment set-up. Choice experiments were conducted to determine the importance of different product attributes and estimate participants' WTP for those attributes. The attributes of longevity, guarantee, price, use and flower arrangement type resulted in a total of 72 (3*2*3*2*2) possible attribute combinations. To avoid potential participant fatigue, we did not include all of the attribute combinations in the experiment. We used a fractional factorial design to generate 24 choice scenarios. A fractional factorial design is often used to improve experiment efficiency by utilizing only a fraction of the attribute combinations in experiments (Chrzan and Orme, 2000). By using a fractional factorial design, experimenters retain the ability to assess all the attributes in the complete design but reduce the time investment of each participant (Chrzan and Orme, 2000).

Mixed flower arrangements and single species arrangements were selected as the target products for several reasons. First, both types of floral arrangements are commonly offered at retail outlets making the two options representative of a real market choice (Society of American Florists, 2005a). Second, different flower species within a mixed arrangement may have different longevities (whereas an arrangement consisting of the same species of flower would have a similar longevity). The flower composition may impact consumers' value of longevity indicators and/or guarantees. The arrangement longevity may be restricted by the flower lasting the shortest time period. For the mixed flower arrangements, a white basket held *Antirrhinum majus* L., *Tulipa* spp. L. , *Gloriosa superb* L., *Ranunculus asiaticus* L., *Chamelaucium uncinatum*

Schauer, *Pittosporum tobira variegate* W.T. Aiton, and *Nephrolepis cordifolia* (L.) K. Presl in a fan-shaped design. The arrangements were approximately 47.5 cm long and 33 cm tall. Figure 2.1 shows examples of the mixed arrangement choice experiment scenarios. Roses (*Rosa x hybrida*), a filler flower (*Gypsophila paniculata* L.), and leather leaf fern (*Rumohra adiantiformis* (G. Forst.) Ching were selected for the single species arrangement because roses are the most popular flower sold at florists (Green, 2011). The single species arrangements were pictured in a clear plastic sleeve. No container or vase was present. The single species arrangements diameters averaged 23 cm. Figure 2.2 shows examples of the single species arrangement choice experiment scenarios. The arrangements were purchased from a floral wholesaler and photographed on a black background.

Each participant was asked to evaluate the alternatives in the 24 scenarios. For each scenario, participants were given three options: arrangement A, arrangement B, or neither arrangement. A complete table of the scenarios is provided in Appendix B. Twelve of the scenarios used mixed flower arrangements and the remaining 12 scenarios used single species flower arrangements. For each type of arrangement (mixed versus single species arrangements), participants were instructed that they were purchasing the product for themselves (self) for six of the scenarios and they were purchasing the product as gifts for the remaining six scenarios. In the choice experiments, product attributes were presented on the product label below the floral image and included arrangement longevity duration (5 - 7 days, 8 - 10 days, 11 -14 days), presence/absence of guarantee, price ($7.99-11.99, $34.99-43.99) and use (gift/self) (Table 2.1). The use attribute (gift or self) was indicated in the scenario introduction. Longevity levels were

determined from previous studies showing what consumers expected cut flower longevity to be and from industry professionals' suggestions (Fanourakis et al., 2013; Regan et al., 2006; Regan et al., 2007; Regan et al., 2008; Särrkä et al., 2001; Teklic et al., 2003; Yue et al., 2009a). Longevity guarantees were either present or absent. Price levels for the arrangements were determined based on prices of comparable products at several floral outlets (e.g. florists, supermarkets and online sources).

Upon completion of the choice experiment scenarios, participants were asked to complete the remaining survey questionnaire questions. The survey questionnaire included Likert scale questions addressing participants' attitudes toward cut flower longevities and guarantees and their socio-demographics (including age, education, gender, household income, relationship status, and number of persons in the household). The attitudinal questions and socio-demographic questions are available from the authors upon request.

Participant recruitment and sampling. Qualtrics Online Survey Software (Qualtrics, LLC, Provo, UT) was used to create the online questionnaire. A third party contractor, MarketTools, was hired to collect the data from a U.S. consumer panel during July 2011. The advantages of using an online survey include rapid deployment, reduced costs, high response rates, and improved access to a broader sample size (McDaniel and Gates, 2010). Participants were recruited from all of the 50 United States. Socio-demographics were not used to screen participants. Instead, participants were screened based on whether or not they had purchased or received cut flowers in the past 12 months. All participants were asked the screening question "Have you purchased or received cut

flowers in the previous 12 months?" If a participant answered 'yes', s/he was asked to complete the choice experiments and questionnaire. Participants were compensated with online reward points.

Data Analysis

Econometric model. STATA/IC 11 (StataCorp, LP, College Station, TX) was used to analyze the data. Specifically, we used a mixed logit model to estimate consumers' preferences and WTP for different flower attributes. The mixed logit model captures the correlations between the choices made by the same participants (Train, 2003). Consumer preferences and WTP for different attribute levels are determined by measuring the underlying utility/satisfaction the consumer derived from the selected product. The utility an individual *i* derived from option *j* in scenario *s* is represented by

(1) $U_{ijs} = \boldsymbol{\beta}'\mathbf{x}_{ijs} + \boldsymbol{\eta}'_i\mathbf{z}_{ijs} + \varepsilon_{ijs}$

where $\mathbf{x}_{ijs}$ and $\mathbf{z}_{ijs}$ are vectors of observed variables for individual *i*. $\mathbf{x}_{ijs}$ includes the variables guarantee, longevity and price while $\mathbf{z}_{ijs}$ includes participants' socio-demographic variables as well the random individual effect. $\boldsymbol{\beta}$ is a vector of fixed coefficients. $\boldsymbol{\eta}$ is a vector of random terms with mean zero (the terms in η are error components). ε_{ijs} is an independent and identically distributed (iid) extreme value error term. When a value is iid each of the variables has the same probability distribution and the variables are not correlated. In the rest of the models, the term *s* is suppressed (Alfnes et al., 2006).

The density of $\boldsymbol{\eta}$ is denoted by $f(\boldsymbol{\eta} \mid \boldsymbol{\Omega})$, where $\boldsymbol{\Omega}$ indicates the fixed parameter of the distribution. The conditional choice probability is a standard logit for a given $\boldsymbol{\eta}$

(2) $$L_{ij}(\boldsymbol{\eta}) = \frac{e^{\beta' x_{ij} + \eta' i z_{ij}}}{\sum_{n \in N} e^{\beta' x_{ij} + \eta' i z_{ij}}}$$

As a result, the unconditional choice probability, *P*, in the mixed logit model is expressed as follows

(3) $$P = \int L_{ij}(\boldsymbol{\eta}) f(\boldsymbol{\eta}|\Omega) d\boldsymbol{\eta}$$

where the logit formula is incorporated into all of the **η** values with the density of **η** as weights.

Specifically, participants' utility is defined as

(4) $$\widehat{U}_{ij} = \hat{\beta}_{0j} + \hat{\beta}_1 Guarantee_{ij} + \hat{\beta}_2 Longevity_{ij} + \hat{\beta}_3 Price_{ij} + \hat{\beta}_4 Age_{ij} + \hat{\beta}_5 Gender_{ij} + \hat{\beta}_6 Income_{ij} + \hat{\beta}_7 Household_{ij} + \hat{\beta}_8 Education_{ij} + \hat{\beta}_9 In\_Relationship_{ij} + \delta_{i+} \varepsilon_{ij} ; i = 1, \ldots, 525 (n)$$

$\widehat{U}_{ij}$ is the latent unobservable utility that participant *i* obtains from choosing alternative *j* and it is measured by the observed choice. Specifically, $\widehat{U}_{ij}$ is the utility/satisfaction that consumer *i* derives from alternative *j*; $Guarantee_{ij}$ is a dummy variable equal to one if the arrangement is guaranteed, zero otherwise; $Longevity_{ij}$ is the longevity (in days) of alternative *j* ; $Price_{ij}$ is the price of alternative *j*; Age_{ij} is the age of participant *i*; $Gender_{ij}$ is the gender of participant *i*; $Income_{ij}$ is the 2010 household income of participant *i*; $Household_{ij}$ is the household size of participant *i*; $Education_{ij}$ is the level of education completed by participant *i*; $In\_Relationship_{ij}$ is the relationship status of participant *i*. δ_i is the random individual effect that captures the correlation between the choices made by the same participants; ε_{ij} is the residual error term that is not captured by the explanatory variables, which is assumed to follow a normal distribution with mean zero and standard deviation σ_ε. There were 525 (*i*) participants and 6 (*j*) alternatives in each model. Four

mixed logit models were estimated based on use (gift or self) and arrangement type (multiple species of flowers or single species of flowers). To avoid multicollinearity, *no guarantee* and *5 – 7 day longevity* were used as the base variables in the estimations.

WTP for an attribute level is defined as the premium participants are willing to pay for an attribute level in comparison with the base level of the attribute. The WTP estimate for an attribute is determined by dividing the coefficient of an attribute ($\hat{\beta}_j$) by the coefficient of price ($\hat{\beta}_3$) and multiplying by -1,

$$(5) \qquad \mathrm{WTP_{ij}} = -1 \text{ x } \left(\frac{\frac{\partial U}{\partial A_j}}{\frac{\partial U}{\partial \mathrm{Price}}} \right) = -1 \text{ x } \frac{\hat{\beta}_j}{\hat{\beta}_3}$$

$\mathrm{WTP_{ij}}$ denotes participant *i*'s WTP for product attribute *j*.

Factor and cluster analysis. In order to identify potential consumer groups or clusters, a factor analysis was performed on the attitudinal questions using STATA/IC 11 software (StataCorp, LP, College Station, TX). Factor analysis is a method used to extract latent constructs, identified as factors, from a larger number of variables. Twenty-four attitudinal questions were subjected to a principal-component factor analysis. A Cronbach's alpha is a measure of internal consistency among the attitudinal questions; a value >0.70 is considered an acceptable level of internal consistency (Tavakol and Dennick, 2011). A principal-component factor analysis was also used to determine the amount of variance accounted for by the factors identified.

Subsequent to the factor analysis, the data was subjected to a Ward's linkage cluster analysis to segment participants based on their stated preferences. A Ward's linkage cluster analysis minimizes the variance within the clusters (Ward, 1963;

Zarantonello and Schmitt, 2010). We used cluster analysis to segment consumers into different groups with similar preferences. Pair-wise t-tests were then conducted to examine whether the factors differed between the clusters.

Results

A total of 525 people participated in the choice experiments and online survey (Table 2.2). The mean age of participants was 43 years old. Most participants had received their college diploma. Fifty-five percent of participants were female, which is consistent with the fact that females are the core consumers for cut flowers (Society of American Florists, 2005b). Seventy-two percent of participants were married or in a relationship (Table 2.2). The mean number of persons in the participants' household was two to three people with a mean 2010 household income of US $63,062. The U.S. Census Bureau statistics from 2010 are provided for comparative purposes (Table 2.2). Overall, our sample participants are slightly older, had completed a higher level of education, and had a higher 2010 household income level than the U.S. population.

Estimation results of the mixed logit models. The presence of guarantees increases the probability that participants select the cut flower arrangement for both mixed arrangements and single flower species arrangements (Table 2.3). Therefore, the first hypothesis "Given the same flower type and the same longevity, consumer preferences are not impacted by longevity guarantees on cut flowers" is rejected. The negative but significant coefficient for price indicates that as price increases, the probability of choosing the cut flower arrangement significantly decreases. Compared to the base of 5

- 7 day cut flower longevity, participants prefer cut flowers with the 11 -14 days longevity the most, followed by the 8 -10 days category. Therefore, the second hypothesis "Given the same flower type, there is no difference between consumer preferences for cut flowers with longer vase life or shorter vase life" is rejected.

Regarding floral arrangements purchased as gifts, the presence of guarantees increases the probability of selecting both types of arrangements (Table 2.3). Additionally, participants prefer floral gifts with greater longevities. Compared to the 5-7 day longevity, participants are most interested in and value cut flowers with the 11-14 days longevity indicators, followed by 8-10 days longevity in both types of arrangements. The first two hypotheses are rejected for cut flowers used as gifts.

Consumer willingness to pay (WTP) estimates. Participants are willing to pay the highest premiums for arrangements with more longevity (Table 2.4). Participants are also willing to pay a premium for a guaranteed arrangement when compared to an arrangement without a guarantee.

Overall, participants value guarantees and extended longevity on cut flower arrangements (Table 2.4). However, contrary to the WTP estimates, when one compares the WTP premium percentages the single species arrangements have the highest WTP premium percentages for floral guarantees and longevity indicators, followed by the mixed arrangements.

Factor analysis. Higher factor loadings for the questionnaire statements in factor 1 (*long_label_support*) indicate consumer interest and trust in longevity information on cut

flower arrangements (Table 2.5). In factor 2 (*long_label_mistrust*), the lower factor loadings for the questionnaire statements "I would trust longevity information at the flower shop" and "I would trust longevity information from a supermarket / grocery" imply lack of trust in longevity indicators.

Factor 3's (*guar_supporter*) higher factor loadings for "I would be excited about cut flower longevity guarantees", "I would want to buy flowers more often because of guarantees", and "A guarantee would give me more confidence to try an unfamiliar flower type" indicate consumer interest in guarantees on cut flowers (Table 2.6). In factor 4 (*selective_guar*), the low factor loadings for "I would want to buy flowers more often because of guarantees" and "If I saw cut flower guarantees often in promotions I would purchase more flowers" imply guarantees would not impact consumers' purchasing behavior. However, the high factor loadings in factor 4 (*selective_guar*) for "If offered a guarantee, I would choose the guaranteed cut flowers over non-guaranteed cut flowers of equal price" and "When considering the same type of flower, I would choose the guaranteed ones" indicate a preference for guarantees when other features are held constant. Factor 5 (*security*) has high factor loadings for "I would be more comfortable spending more money on an expensive floral product with a guarantee", "If I saw cut flower guarantees often in promotions I would purchase more flowers", and "The more expensive the bouquets is, the more willing I am to pay for a guarantee" which suggests guarantees provide security for more expensive arrangements.

For factor 6 (*giver_longlabel*), the lower factor loadings for "As a recipient I would want to contact the store directly and not even tell the giver", "As the recipient, I would like contact information on how to redeem the guarantee subtly included in the

packaging", and "As the recipient, I would like directions on how to redeem the guarantee subtly included in the packaging" indicate low interest in guarantees for floral gifts among floral gift recipients (Table 2.7). Conversely, factor 7 (*recipient_longlabel*) has high factor loadings for these three questionnaire statements indicating greater interest in guarantees for floral gifts as the recipient.

Cluster analysis. Three distinct consumer clusters were identified, hereafter referred to as guarantee seekers, value conscious consumers, and spenders (Table 2.8). Thus our third hypothesis that "Different consumer segments in terms of consumer preferences for cut flower longevities and longevity guarantees do not exist" is rejected. Forty-nine percent of participants were guarantee seekers, 31% were value conscious consumers, and 20% were members of the spenders cluster (Table 2.8).

The guarantee seekers are more likely to select cut flowers with a specified guarantee (as indicated in the higher mean factor score for the *selective_guar* variable; Table 2.8). As gift givers, guarantee seekers prefer guaranteed flowers and longevity labels. However, as gift recipients they did not want longevity information about the flowers.

Value conscious consumers prefer longevity information and guarantees on cut flowers the most (as evidenced by the highest mean factor scores for *long_label_support* and *guar_support* factors; Table 2.8). Value conscious consumers also trust longevity indicators the most among the three clusters (as indicated by the high mean factor score for the *long_label_mistrust* factor; Table 2.8). As gift givers and recipients, value conscious consumers prefer longevity indicators the most (as illustrated by the highest

mean factor scores for *giver_longlabel* and *recipient_longlabel*; Table 2.8). Regarding socio-demographic differences, value conscious consumers have the lowest income compared to the other clusters. Overall, the value conscious consumers actively seek the best value-added attributes for their money.

On average, spenders are the youngest cluster (Table 2.8). Spenders have the highest percentage of males and the highest mean income of the three clusters. Overall, spenders are not interested in longevity information or guarantees on cut flower arrangements regardless of arrangement type or use (as captured in the *long_label_support* and *guar_supporter* factors, Table 2.8). However, spenders are more interested in guarantees on more expensive arrangements (indicated by the *security* factor). Furthermore, spenders are marginally supportive of longevity indicators when they are the floral gift recipients (indicated by the higher *recipient_longlabel* factor mean score).

Cluster WTP estimates. The WTP estimates vary between clusters (Table 2.9). Regardless of use, guarantee seekers are willing to pay the highest premium for the 11-14 days longevity on the mixed flower arrangement, followed by the 8-10 days longevity when compared to mixed arrangements lasting 5-7 days. The guarantee seekers are also willing to pay a premium for a guarantee regardless of use when compared to an arrangement without a longevity guarantee. Similarly, for the single species arrangement, guarantee seekers have the highest WTP for the 11-14 days longevity, followed by the 8-10 days longevity regardless of the use of the cut flowers. Guarantee

seekers are also willing to pay a premium for a guarantee on the single species arrangement when compared to a similar arrangement without a guarantee.

Regardless of the use of cut flowers, the value conscious consumers are willing to pay the most for the 11-14 days longevity on the mixed arrangement, followed by the 8-10 days longevity when compared to the 5-7 days longevity (Table 2.9). Value conscious consumers are also willing to pay substantially more to obtain a guarantee on the mixed arrangement. Similarly, for the single species arrangement, the value conscious consumers are willing to pay the highest premium for the 11-14 days longevity, followed by the 8-10 days longevity when compared to the 5-7 days longevity. Value conscious consumers are also willing to pay a premium for guarantees on the single species arrangement regardless of the cut flower arrangement use.

For cut flowers purchased as gifts and for self use, spenders are willing to pay the greatest premium for the 11-14 days longevity on the mixed arrangements, followed by the 8-10 days longevity when compared to the 5-7 days longevity (Table 2.9). Spenders are willing to pay more for a guarantee on a mixed arrangement for themselves to enjoy when compared to a non-guaranteed arrangement. However, spenders are not willing to pay a premium for a guarantee on a mixed arrangement purchased as a gift. For the single species arrangement, the spenders are willing to pay a premium for the 11-14 days longevity and for the 8-10 days longevity when compared to 5-7 days longevity. Spenders are also willing to pay substantially more for a guarantee on the single species arrangements compared to similar arrangements without guarantees.

Interestingly, longevity and guarantee premiums are not the whole story. When the premiums are added to the base prices we obtain the total WTP. We found spenders

have the highest total WTP, followed by the guarantee seekers, and the value conscious consumers (Table 2.9). Although the spenders are the least interested in longevity indicators and guarantees, they are willing to pay the most for cut flower arrangements whether or not they have these attributes. Conversely, the value conscious consumers have a much lower base price resulting in the lowest total WTP for the cut flower arrangements out of all clusters.

Discussion and Conclusions

Longevity indicators and guarantees. Participants are interested and willing to pay for a cut flower guarantee for both uses and arrangement types, contrary to our first hypothesis. Previous studies show guarantees reduce consumer perceived risks when purchasing floral products resulting in increased consumer satisfaction (Dennis et al., 2004; Behe and Barton, 2000). Our findings are consistent with theirs and indicate consumers are interested in cut flower guarantees. Conflicting with Dennis et al. (2003) who found that guarantees do not affect consumer purchasing decisions on cut flowers, guarantees affect cut flower consumers' purchasing decisions in a positive way (Table 2.3). Our results are consistent with research findings that guarantees are used as quality indicators (Ang and Lee, 2000; Dennis et al., 2004). We conclude that as a value-added tool, longevity guarantees increase consumer interest in, and satisfaction with, cut flowers.

Participants are also interested in cut flower arrangements with greater longevities for both uses of cut flowers and both arrangement types, counter to our second hypothesis. The longevity results are slightly intuitive because vase life

longevity is directly related to cut flower quality for consumers (Ozzambak et al., 2009; Society of American Florists, 2005a). In the retail setting, consumers are not able to see the cut flower longevities, thus labeling the longevity makes it a creditable attribute. As a result, consumers may be dissatisfied if their cut flowers do not live as long as expected, similar to what Dennis et al. (2004) found with potted plants. We conclude longevity indicators are one means for floral retailers to decrease potential consumer dissatisfaction by supplying reasonable expectations for cut flower longevities.

Consumer segments. Value conscious consumers are the most interested in longevity information and guarantees, followed by the guarantee seekers, and then the spenders (Table 2.8). The spenders' low interest in longevity information and guarantees may be attributed to their demographic characteristics. Cut flowers are typically purchased by older women (Society of American Florists, 2005b) whereas spenders are predominantly younger men. Consequently, spenders may not be as interested in these attributes as the other clusters. Another potential explanation is spenders are more interested in other cut flower arrangement attributes not included here (such as color, fragrance, arrangement style, and so on). Other types or combinations of cut flowers in arrangements are outside the scope of our study. Although value conscious consumers are willing to pay the highest premiums for longevity indicators and guarantees, the base prices indicate spenders have the highest total WTP for floral arrangement (Table 2.9). The differences in base prices between the spenders and value conscious consumers clusters may be partially attributed to different income levels. Specifically, the base prices reflect that spenders had the highest 2010 income and are the least price sensitive while the value

conscious consumers had the lowest 2010 income and are the most price sensitive. These results are consistent with Nagle et al. (2011) who demonstrated a strong correlation between income and price sensitivity.

Based on the cluster analysis (Table 2.8), floral retailers can implement target marketing strategies to attract these specific consumer segments. Specifically, to attract the spenders, floral retailers could offer them the option of purchasing guarantees on their cut flower arrangements. Since guarantees are more important on more expensive arrangements, the option of purchasing a guarantee would likely appeal to the spenders cluster. For the guarantee seekers, floral retailers could emphasize and promote guarantees. Regarding the value conscious consumers, floral retailers can use in-store point of purchase materials to promote cut flower longevity and guarantees. Furthermore, retailers could use advertising and other communication campaigns to promote the presence of these attributes to attract value conscious consumers. Sales promotions could also be used to attract value conscious due to their price sensitivity.

All three clusters had the highest premiums for the greatest longevity regardless of use or arrangement type. Future research might help the distribution chain members (breeders, growers, producers, distributors, wholesalers and retailers) estimate the cost to improve longevity and the additional cost of labeling to determine if using longevity labels is profitable. They may also explore if the premium of offering guarantees is high enough to cover the corresponding costs (labeling cost, guarantee redemption cost and associated labor cost, etc.). The cluster WTP estimates can be used by retailers to develop target marketing strategies. Specifically, to assist in determining the optimal pricing strategies in order to attract the consumer segment of interest.

Feasibility of longevity indicators and guarantees on cut flowers in the retail setting. Although providing longevity information and guarantees on cut flowers would benefit floral retailers and consumers alike, predicting postharvest vase life longevity can be challenging. During production, factors impacting cut flower longevity include cultivar, species, temperature, post-harvest treatment, susceptibility to diseases, lighting, ethylene sensitivity and presence, transpiration rates, relative humidity, water access and quality, use of flower preservatives, regional differences, parent plant age and care, plant nutrition, damage (due to mechanical injury, insects or disease), developmental stage, harvest time, and other environmental conditions (de Gelder, 1989; Dole and Wilkins, 1999; Fanourakis et al., 2013; Nell and Reid, 2004; Särrkä et al., 2001; Teklic et al., 2003). Consequently, a major limitation of our study is cut flower longevity is highly variable and greatly based on growing and postharvest handling procedures. This high variability increases retailers' risks if they post longevity information and guarantee those longevities but the product does not perform as expected.

Retailers can take several steps to utilize our results while minimizing their risks. First, although intuitive, retailers should continue to purchase from businesses with the best production and postharvest handling practices. As a result, the highest quality product will give consumers the greatest potential longevity for their cut flowers. Then, in the marketplace, emphasizing proper care and handling is essential to maximize cut flower longevity in the retail center and at consumers' homes (Dole and Wilkins, 1999; Nell and Reid, 2004). As such, educating staff on proper care of cut flowers from product arrival to post-sale is critical. Additionally, retailers can provide consumers with

clear care instructions for their purchase(s). Furthermore, when promoting longevity, retailers need to know the performance of various products in order to generate accurate longevity estimates. Accurate longevity estimates can reduce the possibility of consumer dissatisfaction by setting reasonable expectations for cut flower longevity. As a result, there is a greater probability the promoted longevity is reached even if the arrangement is not in an ideal environment or care instructions are not strictly followed. Retailers can develop clear guarantee redeeming instructions and in-house procedures as well as calculate the implications of these activities. Clear instructions minimize consumer frustration. Clear procedures improve efficiency in handling situations where a guarantee is being redeemed.

One limitation of our study is we conducted our study using online surveys with consumers instead of running in-store trials with consumers while they are shopping. Our results might have the bias common to all surveys. To test the robustness of our results, in-store trials and other experiments can be employed to further explore the impact of longevity information and guarantees on consumers' purchasing decisions.

It is also important to note the experiment was conducted in July 2012. Due to the seasonality of cut flower demand (Society of American Florists, 2005b), our results might not be applicable to other times of the year. Dennis et al. (2003) found cut flower guarantees had a low impact on consumer behavior at Valentine's Day. Future experiments can test the seasonal impacts on the importance of guarantees.

Table 2.1. Choice experiment attributes and attribute levels (mixed arrangement, single species arrangement) used to develop 24 choice experiment scenarios for an online U.S. cut flower consumer preference study conducted in 2011.

	Attribute levels	
Attributes	Mixed arrangement	Single species arrangement
Longevity[z]	5-7 days	5-7 days
	8-10 days	8-10 days
	11-14 days	11-14 days
Guarantee[y]	Yes	Yes
	No	No
Price	$34.99	$7.99
	$37.99	$9.99
	$43.99	$11.99
Use	Self	Self
	Gift	Gift

[z] Longevity length was defined as 'how long the cut flowers would last.'

[y] Guarantee indicated whether the provided longevity was guaranteed or not.

Table 2.2. Descriptive statistics (variables, description of variable, mean±s.e., the 2010 U.S. census mean) for socio-demographic variables of participants in a U.S. online cut flower consumer preference study conducted in 2011 (n=525).

Variables	Description of variables	Mean±s.e.	2010 U.S. census mean[z]
Age	Average participant's age in years	43.098 ± 13.859	37.2
Education	Highest level of education completed 1=some high school/less 2=high school diploma 3=some college 4=college diploma 5=some graduate school 6=graduate degree	4.284 ± 1.495	High school graduate
Gender	Gender of participant 1=male 0=female	0.452 ± 0.498	49.2
Relationship	Relationship status of participant 1=married/in a relationship 0=not married/not in a relationship	0.719 ± 0.450	na
Household	Number of people in household – including dependents and spouse, excluding roommates/renters	2.816 ± 1.477	2.54
Income	2010 gross household income of participants ($1000 USD)	63.062 ± 31.997	51.10

[z] (U.S. Census Bureau, 2013)

Table 2.3. Variables, mixed logit model coefficient estimates (mean±s.e.) for U.S. cut flower consumers' preferences for longevity information and guarantees on cut flower arrangements for mixed flower or single species arrangements (self, gift use), from an online U.S. consumer preference study conducted in 2011 (n=525). Note: A higher coefficient indicates a higher probability of selection when compared to the base variable.

	Mixed flower arrangement		Single species arrangement	
Variables	Self [z]	Gift[z]	Self [z]	Gift[z]
Guarantee	0.854 ± 0.063***	1.022 ± 0.064***	1.185 ± 0.059***	1.149 ± 0.058***
No guarantee	Base	Base	Base	Base
Price	-0.309 ± 0.013***	-0.308 ± 0.013***	-0.621 ± 0.027***	-0.559 ± 0.027***
5-7 days longevity	Base	Base	Base	Base
8-10 days longevity	1.109 ± 0.070***	1.096 ± 0.070***	1.267 ± 0.069***	1.127 ± 0.069***
11-14 days longevity	1.812 ± 0.105***	1.779 ± 0.103***	2.016 ± 0.097***	1.823 ± 0.096***
Socio-demographic variables				
Age	0.002 ± 0.003	0.003 ± 0.003	0.003 ± 0.002*	0.003 ± 0.002*
Gender	-0.043 ± 0.086	-0.011 ± 0.083	0.021 ± 0.047	-0.013 ± 0.047
Education	-0.088 ± 0.090	-0.097 ± 0.087	-0.063 ± 0.049	-0.060 ± 0.049
Household	-0.098 ± 0.090	-0.165 ± 0.087*	0.022 ± 0.049	0.030 ± 0.049
Income	0.028 ± 0.091	0.078 ± 0.088	-0.030 ± 0.050	0.014 ± 0.051
In relationship	-0.053 ± 0.098	0.069 ± 0.095	0.063 ± 0.054	0.084 ± 0.054
Intercept	9.979 ± 0.483 ***	9.835 ± 0.476***	4.195 ± 0.235***	3.649 ± 0.233***
Random individual effect	0.864 ± 0.048	0.830 ± 0.047	5.03e-11 ± 0.035	5.64e-11 ± 0.040
Number of observations	8476	8514	8516	8496
Log likelihood	-5083.773	-5160.533	-5543.649	-5568.425

[z] ***, **, * Significant at $P \leq 0.010$, 0.050, or 0.100 respectively when compared to the *5-7 days longevity* or *no guarantee* variables.

Table 2.4. Participants willingness to pay (WTP) estimates for different product attribute levels for mixed flower and single species arrangements, by use (self/gift), based on a mixed logit model analysis of U.S. online choice experiment of cut flower consumer preferences conducted in 2011 (n=525).

	Mixed flower arrangement		Single species arrangement	
Attribute levels	Self [z]	Gift[z]	Self [z]	Gift[z]
Guarantee	2.762***	3.315***	1.910***	2.056***
No guarantee	Base	Base	Base	Base
5-7 days longevity	Base	Base	Base	Base
8-10 days longevity	3.590***	3.557***	2.041***	2.017***
11-14 days longevity	5.862***	5.773***	3.249***	3.262***
Base price	32.297***	31.909***	6.760***	6.529***

[z] ***, **, * Significant at $P \leq 0.010$, 0.050, or 0.100 respectively when compared to the *5-7 days longevity* or *no guarantee* variables.

Table 2.5. Factor analysis (factor 1, long_label_support; factor 2, long_label_mistrust) factor loadings of questionnaire statements regarding participants' opinions and attitudes about cut flower longevity information. Note: A higher value indicates a higher level of agreement.

Questionnaire statements[zyx]	Factor1 *Long_label_support*	Factor2 *Long_label_mistrust*
"I like the idea of knowing how long to expect cut flowers to last."	0.661	0.246
"I would be more likely to purchase flowers with longevity information."	0.670	0.229
"I would trust longevity information at a flower shop."	0.744	-0.186
"I would trust a longevity information from a supermarket / grocery."	0.627	-0.284

[z] The questionnaire statements were developed from prestudy focus groups.

[y] A Likert scale was used to measure participants' level of agreement with the variable statements (1=strongly disagree, 7=strongly agree).

[x] Variance = 91% and Cronbach's alpha = 0.780

Table 2.6. Factor analysis (factor 3, guar_supporter; factor 4, selective_guar; factor 5, security) factor loadings of questionnaire statements regarding participants' opinions and attitudes about cut flower guarantees. Note: A higher value indicates a higher level of agreement.

Questionnaire statements[zyx]	Factor 3 *Guar_supporter*	Factor 4 *Selective_guar*	Factor 5 *Security*
"I would be excited about cut flower longevity guarantees."	0.133	-0.140	-0.127
"I would want to buy flowers more often because of guarantees."	0.130	-0.446	-0.131
"A guarantee would improve my confidence in the flowers lasting longer."	0.149	0.117	-0.096
"Guarantees indicate quality."	0.084	0.028	-0.081
"If offered a guarantee, I would choose the guaranteed cut flowers over non-guaranteed cut flowers of equal price."	0.093	0.283	-0.148
"When considering the same type of flower, I would choose the guaranteed ones."	0.123	0.212	-0.263
"When considering different types of flowers, I would choose a guaranteed one over non-guaranteed one regardless of flower type."	0.066	-0.097	-0.088
"A guarantee would give me more confidence to try an unfamiliar flower type."	0.131	0.078	-0.067
"I would be more comfortable spending more money on an expensive floral product with a guarantee."	0.117	0.257	0.356
"If I saw cut flower guarantees often in promotions I would purchase more flowers."	0.147	-0.382	0.348
"I would likely bring my flowers back for a full refund if they didn't last as long as the minimum number of days."	0.052	0.038	0.060
"The more expensive the bouquet is, the more willing I am to pay for a guarantee."	0.065	0.122	0.304

[z] The questionnaire statements were developed from prestudy focus groups.

[y] A Likert scale was used to measure participants' level of agreement with the variable statements (1=strongly disagree, 7=strongly agree).
[x] Variance=90% and Cronbach's alpha=0.919

Table 2.7. Factor analysis (factor 6, giver_longlabel; factor 7, recipient_longlabel) factor loadings of questionnaire statements regarding participants' opinions and attitudes about cut flower longevity information on floral gifts. Note: A higher value indicates a higher level of agreement.

Questionnaire statements[zyx]	Factor 6 *Giver_longlabel*	Factor 7 *Recipient_longlabel*
"A cut flower guarantee would be more important for flowers I give as gifts than for myself."	0.172	0.123
"A guarantee on floral gift would make me feel better as the giver because the gift would reflect more positively on me."	0.264	0.203
"If I buy flowers for a long term gift then a guarantee is very important."	0.217	0.210
"Guarantees are more important when giving the gift to someone who likes flowers."	0.181	0.131
"If I give flowers and they die quickly, I feel bad, a guarantee would lessen this concern."	0.068	0.107
"As the recipient I would want to contact the store directly and not even tell the giver."	-0.103	0.081
"As the recipient, I would like contact information on how to redeem the guarantee subtly included in the packaging."	-0.429	0.248
"As the recipient, I would like directions on how to redeem the guarantee subtly included in the packaging."	-0.358	0.224

[z] The questionnaire statements were developed from prestudy focus groups.

[y] A Likert scale was used to measure participants' level of agreement with the variable statements (1=strongly disagree, 7=strongly agree).

[x] Variance=91% and Cronbach's alpha=0.848

Table 2.8. Factors, factor definitions, and three cut flower consumer clusters (guarantee seekers, value conscious consumers, spenders) derived from Ward's linkage cluster analysis means based on an online U.S. cut flower consumer preference study conducted in 2011 regarding their attitudes and opinions about cut flower longevity indicators and guarantees (n=525).

Factors[z]	Factor definitions	Guarantee seekers cluster (49% of the sample)	Value conscious consumers cluster (31% of the sample)	Spenders cluster (20% of the sample)
Long_label_support [abc]	Participants want longevity labels on cut flowers	-0.051	0.640	-0.888
Long_label_mistrust [ac]	Participants do not trust longevity labels on cut flowers	0.023	-0.024	-0.009
Guar_supporter [abc]	Participants want guarantees on cut flowers	-0.045	0.813	-0.954
Selective_guar [abc]	Participants would select a guaranteed cut flower over a non-guaranteed cut flower	0.190	-0.103	-0.575
Security [abc]	As the price of the cut flower arrangement increases, the importance of a guarantee increases	-0.055	-0.007	0.051
Giver_longlabel [abc]	As a gift giver, the participant prefers longevity labels on cut flowers	0.158	0.563	-1.226
Recipient_longlabel [abc]	As a gift recipient, the participant prefers longevity labels on cut flowers	-0.306	0.589	0.239
Age [abc]	Age of participants in years	43.638	44.312	38.978

Gender [abc]	Gender of participants 1=male, 0=female	0.404	0.399	0.641
Income [abc]	2010 gross income of participants	63.326	60.101	66.156
Household	Number of people in household – including dependents and spouse, excluding roommates/renters	2.848	2.826	2.787
In_relationship [abc]	Relationship status of participants	0.730	0.736	0.681
Education [abc]	Highest level of education completed by participants	4.352	3.938	4.337

[z] Pair-wise t-tests were performed to determine significance between clusters.

[a] Significant difference between guarantee seekers cluster and value conscious consumers cluster (p-value ≤0.010).

[b] Significant difference between guarantee seekers cluster and spenders cluster (p-value ≤0.010).

[c] Significant difference between value conscious consumer cluster and spenders cluster (p-value ≤0.010).

Table 2.9. Guarantee seekers, value conscious consumers, and spenders clusters members' willingness to pay (WTP) estimates for different variables (product attribute levels) compared to the base price for cut flower arrangements purchased by use (self/gift), based on an online choice experiment of U.S. cut flower consumer preferences conducted in 2011 (n=525).

	Mixed species arrangement					
	Guarantee seekers cluster		Value conscious consumers cluster		Spenders cluster	
Variables	Self Premium[z]	Gift Premium[z]	Self Premium[z]	Gift Premium[z]	Self Premium[z]	Gift Premium[z]
Guarantee	2.220 ± 0.210***	3.028 ± 0.221***	5.042 ± 0.417***	5.993 ± 0.401***	1.193 ± 0.430***	0.002 ± 0.476
No guarantee	Base	Base	Base	Base	Base	Base
5-7 days longevity	Base	Base	Base	Base	Base	Base
8-10 days longevity	3.233 ± 0.250***	3.566 ± 0.271***	4.650 ± 0.490***	4.432 ± 0.426***	2.803 ± 0.469***	2.147 ± 0.459***
11-14 days longevity	5.315 ± 0.260***	5.623 ± 0.274***	7.550 ± 0.474***	7.576 ± 0.418***	4.296 ± 0.533***	3.374 ± 0.571***
Base price	33.107 ± 0.729***	31.637 ± 0.762***	29.519 ± 1.289***	29.904 ± 1.119***	34.454 ± 1.706***	35.553 ± 1.910***
Number of obs.	4052	4074	2296	2302	1364	1372
Log likelihood	-2387.180	-2465.009	-1449.639	-1416.754	-752.872	-721.099

	Single species arrangement					
	Guarantee seekers cluster		Value conscious consumers cluster		Spenders cluster	
Variables	Self Premium[z]	Gift Premium[z]	Self Premium[z]	Gift Premium[z]	Self Premium[z]	Gift Premium[z]
Guarantee	1.731 ± 0.095***	1.659 ± 0.110***	3.126 ± 0.238***	4.592 ± 0.432***	0.805 ± 0.197***	0.717 ± 0.180***
No guarantee	Base	Base	Base	Base	Base	Base
5-7 days longevity	Base	Base	Base	Base	Base	Base
8-10 days longevity	1.960 ± 0.116***	2.030 ± 0.137***	2.563 ± 0.225***	2.723 ± 0.300***	1.492 ± 0.233***	1.614 ± 0.209***
11-14 days longevity	2.928 ± 0.112***	3.130 ± 0.132***	4.398 ± 0.245***	4.542 ± 0.328***	2.639 ± 0.234***	2.545 ± 0.213***
Base price	7.106 ± 0.215***	6.868 ± 0.255***	5.598 ± 0.454***	4.854 ± 0.633***	7.485 ± 0.433***	7.219 ± 0.483***
Number of obs.	4066	4066	2302	2286	1376	1372
Log likelihood	-2611.129	-2661.648	-1439.935	-1409.381	-895.182	-864.802

[z] ***, **, * Significant at $P \leq 0.010$, 0.050, or 0.100 respectively when compared to the *5-7 days longevity* or *no guarantee* variables.

Scenario 1 – Consider a situation where you are provided two cut flower choices and you are purchasing one for YOURSELF. Which arrangement would you purchase? Note: Bar=5cm.

Choice A	***Choice B***	***Neither arrangement***
Longevity 5-7 days *No guarantee* *Cost $34.99*	*Longevity 8-10 days* *Guaranteed* *Cost $37.99*	

Scenario 2 – Consider a situation where you are provided two cut flower choices and you are purchasing one as GIFTS for OTHERS. Which arrangement would you purchase? Note: Bar=5cm.

Choice A	***Choice B***	***Neither arrangement***
Longevity 11-14 days *No guarantee* *Cost $43.99*	*Longevity 5-7 days* *Guaranteed* *Cost $34.99*	

Figure 2.1. Examples of the 12 online choice experiment scenarios used to investigate consumer preferences for longevity indicators and guarantees on mixed species cut flower arrangements in an online U.S. consumer preference study conducted in 2011. Bar = 5cm.

Scenario 3 – Consider a situation where you are provided two cut flower choices and you are purchasing one for YOURSELF. Which arrangement would you purchase? Note: Bar=5cm.

Choice A	***Choice B***	***Neither arrangement***
Longevity 5-7 days *Guaranteed* *Cost $9.99*	*Longevity 8-10 days* *No guarantee* *Cost $7.99*	

Scenario 4 – Consider a situation where you are provided two cut flower choices and you are purchasing one as GIFTS for OTHERS. Which arrangement would you purchase? Note: Bar=5cm.

Choice A	***Choice B***	***Neither arrangement***
Longevity 11-14 days *No guarantee* *Cost $11.99*	*Longevity 5-7 days* *Guaranteed* *Cost $7.99*	

Figure 2.2. Examples of the online choice experiment scenarios used to investigate consumer preferences for longevity indicators and guarantees on single species cut flower arrangements in an online U.S. consumer preference study conducted in 2011. Bar = 5cm.

CHAPTER 3: Does Visual Attention to Product Attributes on Minimally Processed Horticultural Products Impact Consumer Preferences?[2]

Visual stimuli affect consumers' preferences and willingness to pay (WTP) for products. However, consumers are exposed to a large amount of visual stimuli while they are making their purchasing decisions. Therefore, determining what product attributes are visually noticed and impact purchasing decisions is challenging. Eye-tracking and experimental auctions were conducted to estimate consumer WTP for different product attributes on minimally processed horticultural products (apple juice, roasted peanuts, salad mix). Products with varying production methods (organic, "all natural), origin (local, domestic, import) and nutrient content claims (present, absent) were presented to consumers as their eye movements were recorded. Tobit models were used to analyze the data. The analysis of eye-tracking data allowed researchers to relate consumers' visual search behavior with their WTP bids for the products. We found consumers' visual attention increases for important or complex product attributes that positively or negatively affect their WTP bids. Participants who fixate more on the organic logo or "all natural" are willing to pay more for apple juice. Conversely, participants who fixate more on imported apple juice are willing to pay less for apple juice. More fixations on the organic logo on roasted peanuts results in a higher WTP. For the salad mix, additional nutrient content claim fixations increases participants' WTP; however, more fixations on "all natural" decreases participants' WTP. Consumers' socio-demographics impact their WTP bids and visual attention to product attributes. We conclude retailers

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could use in-store marketing strategies to improve the visibility of attributes that improve consumers' WTP.

Introduction

The amount of information consumers evaluate when making food purchasing decisions is substantial, making in-store differentiation important. In 2012, the average U.S. supermarket carried 42,686 products (Food Market Institute, 2013). Retailers use point of purchase materials (e.g. product labels, signs, packaging, etcetera) to differentiate products in the retail setting (Areni et al., 1999). In-store differentiation is important because the majority of consumers' final purchasing decisions occur at the point of purchase (Food Institute Report, 1987; Peck and Childers, 2006). Additionally, point of purchase materials are of interest because they impact consumers' purchasing decisions (Brunso et al., 2002).

The U.S. Food and Drug Administration (2008) regulates food products' labels. A statement of identity (the product's name) and the net quantity are required on the front of the package (U.S. Food and Drug Administration, 2008). Edible processed horticulture product labels can also include production method, product origin, and nutrient content claim (NCC). For processed goods, only those of foreign origin are required to label the origin (Agricultural Marketing Service, 2009). Production methods and NCCs are not required by the U.S. Food and Drug Administration (2008) but are often added to attract consumers and generate value for businesses.

"Organic" and "all natural" are the two main production and processing methods for horticultural products (Grunert, 2005; Solano, 2008; USDA, 2013). Currently, the U.S. Federal Government has regulations and standards for organic production and processing but not for "all natural" (USDA, 2012; USDA, 2013). Organic purchasers focus on potential personal and environmental health benefits (Aertsens et al., 2009;

Magnusson et al., 2001). Due to these perceived benefits, organic consumers are willing to pay premiums for organic products (Gil et al., 2000; Govindasamy and Italia, 1999; Hu et al., 2011; James et al., 2009; Zanoli et al., 2012). Consumers who do not purchase organic products are concerned about the increased cost, low availability, lack of trust, and product appearance of organic products (Aertsens et al., 2009; Magnusson et al., 2001).

The U.S. Food and Drug Administration (2012) defines "all natural" as not containing added color, artificial ingredients, and being minimally processed. Many consumers do not differentiate between "all natural" and organic production (Solano, 2008; TNS, 2004). Additionally, consumers often believe organic and "all natural" production practices indicate superior quality (Grunert, 2005). Consumers' value organic horticultural products, but do they value "all natural" products? Many processed products have an "all natural" label on their packages. However, unlike organic production methods, "all natural" production methods are not highly regulated.

Another label attribute is product origin. In 2002, the USDA Farm Bill was amended to include a Country of Origin Labeling (COOL) Bill (Agricultural Marketing Service, 2012). The COOL Bill requires retailers to notify consumers about the origin of certain commodities including fresh and frozen fruits, vegetables, meats, and other food products (Agricultural Marketing Service, 2012). COOL assists consumers in making informed decisions by notifying them of the origin of their food. Processed horticulture products are not required to have an origin label under the COOL Bill (Agricultural Marketing Service, 2009). Instead, if the processed foods are from foreign origins,

retailers are required to indicate the products' country of origin under the Tariff Act of 1930 (Agricultural Marketing Service, 2009).

U.S. consumers view domestic products as safer, higher quality, and tastier options when compared to imported products (Kloeckner et al., 2010; Krissoff et al., 2004; Purduri et al., 2006; Stolzenbach et al., 2013). Consumers' positive perceptions are likely due to U.S. consumers' familiarity with domestic safety regulations and production standards (Kloeckner et al., 2010; Krissoff et al., 2004; Loureiro and Umberger, 2005; Lusk et al., 2006; Stolzenbach et al., 2013). Safety of imported foods differs, i.e. Chinese juice producers recently received negative publicity about heavy metal contamination in apple juice (The New York Times, 2013). Consequently, consumers are willing to pay more for domestically produced foods (Hu et al., 2011; Loureiro and Umberger, 2005; Mabiso et al., 2005; Purduri et al., 2006).

Along with domestic origin, consumers also show interest in products from the local area (Collart et al., 2013; Hu et al., 2011; Stolzenbach et al., 2013). Locally produced products are more attractive to consumers when compared to products from other origins due to perceived quality, safety and economic benefits (Stolzenbach et al., 2013). Thus, consumers are willing to pay premiums for local products (Collart et al., 2013; Hu et al., 2011).

Consumer preferences and willingness to pay (WTP) for fresh produce from different origins has been extensively studied (Chung et al., 2009; Johnecheck et al., 2010; Kloeckner et al., 2010; Mabiso et al., 2005; Purduri et al., 2006). But, to the authors' knowledge, little research exists about the impact of origin labels on consumer preferences for processed horticultural products.

Another attribute used to differentiate products and attract consumers is nutrient content claim (NCC) labels. According to the U.S. Food and Drug Administration (2008), NCCs are statements with some indication of the level of nutrients within the food (such as good source of, high in, enriched, contains, low in, fortified with, extra, and so on). NCCs impact consumer perceptions and search behaviors (Ares et al., 2008; Kozup et al., 2003; Roe et al., 1999). Consumers believe products with NCCs are healthier compared to products without NCCs (Kozup et al., 2003). NCCs are perceived as more believable if the nutrient is naturally found in the product (Ares et al., 2008). Often consumers limit their visual search to the front of the package (where the NCC is shown) if a NCC is present (Roe et al., 1999). However, not all consumer perceptions are positive, and some consumers view NCCs as not credible, marketing stunts, misleading, and not sufficiently investigated (Verbeke, 2010). NCCs impact consumer behavior and perceptions, but do consumers actually notice NCCs as they make their purchasing decisions?

The purpose of the study was to investigate the impact of production method, origin, and NCC labels on consumers' WTP for minimally processed horticulture products. Then evaluate how consumers' visual attention to these attributes affects their WTP bids for the products. Specifically, five hypotheses were tested:

1. Given the same type of product, there is no difference between participants' WTP for organically produced and processed products when compared to conventional products;
2. Given the same type of product, there is no difference between participants' WTP for organic and "all natural" products;

3. Given the same type of product, there is no difference between participants' WTP for local and domestic products when compared to imported products;
4. If a NCC is present, participants are not willing to pay a premium for the product;
5. And, greater visual attention to production methods, product origins, and NCC will not impact participants' WTP bids for the products.

Materials and Methods

Research approval. The study instruments and protocols were submitted for review by the University of Minnesota Institutional Review Board (IRB) prior to the commencement of the experiments. All were approved under U.S. federal guidelines 45 CFR Part 46.111 on September 19, 2011 (#1108S03942; Appendix C).

Products and attributes. Apple juice (64 fl. oz.), roasted peanuts (12 oz.), and salad mix (5 oz.) were the products used in this experiment (Table 3.1). These products were selected because they are readily available in most retail grocery outlets and are frequently consumed in the U.S. Additionally, they represent horticultural goods with different levels of processing. The original product (raw apples) in apple juice is not recognizable. Roasted peanuts consist of cooked peanuts that are still recognizable. Salad mix is a mix of raw chopped lettuces.

Production method types included "all natural", organic and conventional (Table 3.1). The text "all natural" was on the product's label. The USDA organic logo was

present on the labels of organic products. Conventional products did not have any production method on the label.

The origin labels were domestic, import, and local (Table 3.1). 'Minnesota grown' was used to denote the local origin of the products. The import country of origins were based on the USDA import data (ERS – USDA, 2012a; ERS – USDA, 2012b; ERS – USDA, 2012c). The top countries known for exporting the products into the U.S. were used. China was the import country for apple juice while Canada was for roasted peanuts, and Mexico was for salad mix. (ERS – USDA, 2012a; ERS – USDA, 2012b; ERS – USDA, 2012c).

The NCCs were product specific and determined from retail observations (including online sources, grocery stores, and mass retail centers; Table 3.1). Information was collected on front of package NCCs, net weight, production methods, and origins. Frequency of use and terminology were noted. The most frequently displayed NCCs were used in the experiment. To investigate naturally occurring versus added nutrients, the apple juice NCCs were "enriched" and "naturally high" in vitamin C. Naturally occurring nutrients have a more positive impact on consumer preferences than enriched nutrients (Ares et al., 2008). All of the NCCs were presented as text on the product labels.

The combination of the levels for the attributes production method, origin and NCC resulted in a total of 27 (3^3) possible apple juice labels and 18 possible roasted peanut labels (3^2*2) and salad mix (3^2*2) labels. As a result, there were 63 possible product labels. However, due to potential participant fatigue, it was not practical to test all attribute combinations. Two versions of product label sets were developed using a

fractional factorial design (generated by JMP 11 Software, SAS Institute, Inc., Cary, NC), one with 23 product images and a second version with 24 product images (Appendix D). A fractional factorial design decreases participant fatigue by using only a fraction of the possible product/label combinations (Chrzan and Orme, 2000).

The product images and labels were displayed centrally on the computer monitor with a black background. The labels were located on the front of the products' packages. Each attribute (except the organic logo) was in 24-point Times New Roman font (fig. 3.1). To comply with U.S. food labeling requirements, the statement of identity (e.g. apple juice, roasted peanuts, and salad mix) was displayed at the top center of the labels in 34-point font (U.S. Food and Drug Administration, 2008). The net quantity statements were located at the bottom of the labels in 12-point font and were consistent with the auction products (U.S. Food and Drug Administration, 2008). The attributes were displayed between the statement of identity and net quantity statements. Production method was located below the statement of identity, followed by the NCC, and then the origin.

Experimental auction mechanism. Experimental auctions are used to elicit participants' WTP and preferences for products and product attributes. In a typical incentive compatible mechanism (i.e. people have an incentive to truthfully reveal their preferences) subjects bid to obtain one or more goods (Vickrey, 1961). When the bids are submitted, participants do not know the market price. Therefore, the participant has a weakly dominant strategy to submit a bid that is equal to his/her exact value for that product (Lusk and Shogren, 2007). The highest bidder(s) wins the auction and pays a

price (e.g. market price) that is determined exogenously from the individual(s)' bid(s). Each participant has the opportunity to win one item (which is randomly determined and termed the 'binding round'), thus mitigating diminishing marginal utility where the value of the unit decreases as the quantity of items purchased increases (Lusk and Shogren, 2007).

A Becker-DeGroot-Marschak (BDM) experimental auction was used in the experiment because participants completed the auctions individually instead of as a group (Lusk and Shogren, 2007; Noussair et al., 2004). Individual participation was required to facilitate the use of eye-tracking. .

Eye-tracking. Eye-tracking analysis is a valuable research tool used to examine visual stimuli that attracts consumers' attention and impacts their decisions (Bix et al., 2009; Duchowski, 2007; Horstmann et al., 2009; Rosbergen et al., 1997). Eye-tracking is noninvasive and consumers often forget their eyes are being tracked (Maughan et al., 2007). Thus, eye-tracking accurately records what consumers observe in a real retail setting while they are shopping.

To capture eye movement data, a Tobii X1 Light Eye Tracker was rented from Tobii Technology (www.tobii.com; Stockholm, Sweden). The X1 Light Eye Tracker was selected because the eye-tracking camera uses both bright pupil and dark pupil illumination to record eye movements (Tobii, 2013). Using both types of illumination is advantageous because different types of illumination work better on different types of eyes. Bright pupil illumination is better for light colored eyes while dark pupil illumination is better for dark colored eyes (Tobii, 2013). Another advantage is the X1

Light Eye Tracker is inconspicuously mounted on a computer monitor and provides the same level of accuracy as other eye-tracker options (Tobii, 2013). After all eye movements are recorded, geometric areas of interest (AOI) can be outlined in the Tobii Studio Software (Tobii Technology; Stockholm, Sweden). In the current experiment AOI were outlined around the organic logo, "all natural" text, origin text, and NCC text *(cf.* Behe et al., 2013). Visual data can then be analyzed for each AOI.

Fixation counts (FC) were used for analysis as information acquisition occurs during fixations (Pieters et al., 2002). The FC indicates the number of eye fixations per AOI. Specifically, FC was used as a measure of visual processing and attention (Jacob and Karn, 2003; Velichkovsky et al., 2002) with more fixations occurring when the information was difficult to understand or important to participants (Bialkova and van Trijp, 2011; Meissner and Decker, 2010; Pieters and Wedel, 2007).

Visual data does not show what consumers are thinking or how they may act upon the information they have received (Wedel and Pieters, 2000). Consequently, eye-tracking needs to be paired with other research methods. Here, experimental auctions were used to identify the impact of visual attention to different product attributes on consumers' WTP for the products.

Eye-tracking experiment and experimental auction. Upon arrival participants were given an ID number and a bid sheet. Each participant sat approximately 66 cm away from the front of the eye-tracking computer monitor. Participants read the IRB consent form and experimental auction instructions on the computer monitor. The eye-tracking camera was then calibrated to each participant using a 5 point calibration system of Tobii Studio

Professional version 2.2.8 (similar to Ares et al., 2013). A mouse click advanced the images. Participants clicked through the images independently to grant them with adequate time to evaluate the products and determine their WTP bids. Sufficient time was important because time pressure impacts visual search behavior (Pieters and Warlop, 1999).

If the eye-tracking camera was unable to calibrate to the participant, the participant used the "preview" option to complete the experimental auction without having his/her eyes tracked. In the "preview" option, participants view the products, click through the images, and submit their WTP bids using the same method as the calibrated participants. By using the "preview" option, the auction data was still usable even though the eye-tracking camera was unable to record the participant's eye movements.

The task the experimental subjects need to finish also influences their visual attention (Ares et al., 2013; Horstmann et al., 2009; Land et al., 1999). Here, participants were given the task of determining their WTP product price. As a result, the fixations should be affected by the major factors that influence participants' WTP bids. Furthermore, by combining eye-tracking with experimental auctions participants were placed in a real purchasing situation. As a result, participants had incentives to visually inspect the products as they would in a real retail setting.

To familiarize the participants with the eye-tracking technology and the experimental auction procedure, one round of practice auctions with candy bars (e.g. 3 Musketeers®, Mars Inc., McLean, VA) was ran before conducting the formal auctions. In the practice and formal auctions, a participant was first shown the front image of the

product (fig. 3.2). Then s/he was asked if s/he wanted more information (yes/no). If the answer was yes, the participant was shown the nutritional information of the product. Finally, the participant was asked to write down his/her WTP bid for the product (fig. 3.2). If the participant did not want more information after seeing the front image of the product, s/he was asked to write down his/her WTP bid without seeing the additional nutritional information of the product. The steps of the experimental procedure were repeated for each product. After the experiment, the participants filled in a post-experiment survey with typical socio-demographic questions (see Table 3.2).

While the participant completed the survey, the moderator determined if s/he won the auction by randomly drawing the binding auctioned item and market price. The market price options were determined based on observed market prices. If the participant bid higher than the randomly drawn market price s/he won the item but only paid the market price for the item.

If participants did not win, they were compensated $30 for their time. If they won the auction, they were compensated $30 minus the market price and they received the item they won, making the study incentive compatible. Consequently, each participant left with $30 worth of compensation.

Participant recruitment and experimental set-up. Participants were recruited from Minneapolis-St. Paul, MN, and the surrounding area using advertisements in 13 local newspapers and on Craigslist. Newspapers and Craigslist have wide readership in all of the socio-economic classes in the Minneapolis - St. Paul area. In order to recruit a representative sample, the advertisement specified that only the household's primary

grocery shopper could participate in the experiment. Primary grocery shoppers were recruited because they make the majority of food purchasing decisions (Food Institute Report, 1987; Peck and Childers, 2006). None of the products were mentioned in the advertisements to avoid bias.

Participants were scheduled at 30 minute intervals over the course of seven days in April 2012. Day and evening times were available to facilitate a broader demographic of participants.

The study was conducted in an empty university office. Two desks with chairs were in the office. The eye-tracking computer was on one desk and the second held the post-experiment survey. A bid sheet, pencil, and receipt were in front of the eye-tracking computer. The products were out of sight therefore participants relied solely on the computerized images to determine their WTP bids.

Data Analysis

Econometric model. STATA/IC 11 (StataCorp, LP, College Station, TX) software was used to analyze the data. A tobit model was used to analyze the experimental auction data. Tobit models estimate the relationship between the dependent variable (i.e. WTP bids) and the independent variables (e.g. dummy variables for product attributes; fixation counts for product attributes) (Bernard et al., 2007). In the auction, the lowest bid participants could submit was zero even though s/he might have had a negative value for a product. Since participants' bids were left censored at zero, tobit models were used. The tobit model can be expressed as follows:

(1) $WTP_{ij} = X_{ij}\beta + \varepsilon_{ij}$ *if* $X_{ij}\beta + \varepsilon_{ij} > 0$; j = apple juice, roasted peanuts, salad mix

$WTP_{ij} = 0$ *if* $X_{ij}\beta + \varepsilon_{ij} \leq 0$

$i = 1, 2, \ldots, n,$

where WTP_i is the left censored dependent variable which is the WTP bid submitted by participant i for product j; X_{ij} is the vector of explanatory variables (including the product attributes [production method, origin, NCC] and participant's socio-demographics [age, relationship status, young children at home, gender, 2011 income, household size, and education]); β is a vector of the estimated parameters; and the ε_i term is the random error for the unmeasured effects. The ε_i is assumed to have a normal distribution with mean zero. The tobit models were run separately for each product.

Two sets of tobit models were estimated. In the first set, dummy variables were generated for the explanatory variable attributes. Most consumer WTP research for product attributes use dummy variables (Govindasamy and Italia, 1999; Hu et al., 2011; Mabiso et al., 2005; Purduri et al., 2006; Yue et al., 2009b). The dummy variables included: *organic* (1 if the product was organically produced, zero otherwise); *natural* (1 if the product was "all natural", zero otherwise); *conventional* (1 if the product was conventionally produced, zero otherwise); *local* (1 if the product was Minnesota grown, zero otherwise); *domestic* (1 if the product was a product of the U.S.A, zero otherwise); *import* (1 if the product was imported, zero otherwise); *NCC* (1 if the product had a NCC, zero otherwise); *no NCC* (1 if the product did not have a NCC, zero otherwise). For the apple juice product, the NCC was represented by two dummy variables – *naturally high* (1 if the product was labeled with 'naturally high in vitamin C', zero otherwise) and *enriched* (1 if the product was labeled with 'enriched in vitamin C' and

zero otherwise). To avoid perfect multicollinearity, one of the dummy variables for each attribute must be omitted from the tobit model and used as a base for comparison meaning that the estimated coefficients are relative to that base variable (Greene and Hensher, 2008). For example, *imported* was use as a base for comparison for origin, *conventional* was used as a base for production method, and *no NCC* was used as a base for the NCC variables.

After completing the first set of tobit models using dummy variables for the attributes, another set of tobit models using FC for the product attributes as the explanatory variables were conducted. The second set of tobit models were used to examine how participants' attention to the attributes affected their bids. A positive coefficient indicates that when participants fixate more in the attribute their WTP for the attribute increases. Conversely, a negative coefficient indicates when participants fixate more in that attribute their WTP decreases.

Results

A total of 102 people participated in the experimental auction and eye-tracking study. Ninety-eight experimental auction observations (96%) were usable. Not all participants were able to have their eye movements tracked. Consequently, a total of 93 (91%) participants' eye movements were successfully tracked and included in the analysis of how fixation counts affect participants' WTP bids. The average participant was 51 years old, without young (< 12 years old) children at home, and had a 2011 household income of $51,966 (Table 3.3). Sixty-four percent of participants were married or in a relationship. Seventy-three percent of participants were female, which is consistent with

women being the primary household grocery shoppers (Dholakia, 1999). On average, participants spent $91.45 on groceries each week (Table 3.3). The 2011 Minnesota Census data is provided for comparison purposes. In general the sample was older, had completed a higher level of education, and had a lower income than the Minnesota population.

Tobit model results using dummy variables for product attributes. Participants' are willing to pay more for organic apple juice compared to the conventional apple juice (Table 3.4). For apple juice, the first hypothesis that "there is no difference between participants' WTP for organically produced and processed products when compared to conventional products" is rejected. The "all natural" dummy variable coefficient is not significant supporting the second hypothesis that "there is no difference between participants' WTP for organic and "all natural" products." Local and domestic apple juice are valued more than imported apple juice. The third hypothesis that "there is no difference between participants' WTP for local and domestic products when compared to imported products" is rejected. Neither of coefficients for the apple juice NCC dummy variables are significant. Therefore, the fourth hypothesis that "if a NCC is present, participants are not willing to pay a premium for the product" is not rejected for apple juice. Those participants who are older, in a relationship, or have a higher household income are willing to pay less for apple juice. Participants with larger households have a higher WTP for apple juice compared to those with a smaller household size. Children less than 12 years old in the household, gender, and level of education do not significantly affect participants' WTP for apple juice. Participants with higher

household incomes are willing to pay more for locally and domestically produced apple juice compared to participants with lower incomes. Overall, participants are willing to pay the greatest premium (46%) for local apple juice, followed by apple juice that is domestic (38%), organic (12%), with NCC-enriched with vitamin C (8%), "all natural" (7%), and with NCC-naturally high in vitamin C (6%).

For roasted peanuts, none of the coefficients for the attribute dummy variables are significant (Table 3.4). Therefore, for roasted peanuts, we fail to reject the first four hypotheses. Older participants are willing to pay less for roasted peanuts compared to their younger counterparts. Participants who are in a relationship or have completed a higher level of education are willing to pay less for roasted peanuts. Participants with children younger than 12 years old in the household or that have a higher household income are willing to pay more for roasted peanuts. Gender and household size do not significantly affect participants' WTP for roasted peanuts. Participants are willing to pay the highest premium (8%) for "all natural" roasted peanuts, followed by roasted peanuts that are organic (7%), local (4%), domestic (1%), or have the NCC-low sodium (0.1%).

For salad mix, participants are willing to pay a premium for organic when compared to conventional counterparts (Table 3.4). The first hypothesis that "there is no difference between participants' WTP for organically produced and processed products when compared to conventional products" is rejected. "All natural" salad mix is not significant. Local and domestic salad mix is valued more than imported salad mix, so the second hypothesis is rejected for salad mix (Table 3.4). The coefficient for NCC is not significant, therefore, the fourth hypothesis that "if a NCC is present, participants are not willing to pay a premium for the product" fails to be rejected for salad mix.

Participants who are older, in a relationship, have children younger than 12, have a higher household income, or have achieved a higher education level are willing to pay less for salad mix. Larger households have a positive impact on WTP for salad mix when compared to smaller households. Gender did not impact WTP. However, males are willing to pay less for domestic and local salad mix than females. Local salad mix attained the highest premiums (20%), followed by organic (15%), domestic (9%), NCC-high in fiber (5%), and "all natural" (3%).

In the survey, participants were asked to indicate their level of understanding the two production and processing methods, "all natural" and organic. Overall, most participants are not sure what "all natural" means and they are skeptical about "all natural" products. Approximately 38% of participants purchase "all natural" products when they are available.

Participants were also asked to specify their preferences for minimally processed horticultural products' origin (Fig. 3.3). Eighty-nine percent of participants prefer local (Minnesota) processed horticulture products, followed by US (85%), Canada (52%), and Mexico (27%). Out of the 14 origins, China is the second least preferred option with only 3% of participants preferring products from China.

Additionally, participants were asked to indicate their primary reasons for selecting their preferred product origin(s) (Fig. 3.4). The top reason is stricter regulations (50%), followed by familiarity with the origin (49%), less transportation (45%), safer products (41%), and better quality products (39%).

Tobit model results using fixation count variables for product attributes. Participants who fixate more on organic and "all natural" attributes have a higher WTP for apple juice with these attributes (Table 3.5). The coefficients of FC on local or domestic attributes are not significant. More fixations on the import attribute results in a lower WTP for imported apple juice. FC on the NCCs do not impact participants' WTP. The fifth hypothesis that "greater visual attention to production methods, product origins, and NCC will not impact participants' WTP bids for the products" is rejected for apple juice. The socio-demographic results are comparable to the tobit model results using dummy variables for the product attributes.

Participants with greater fixations on the organic attribute have a higher WTP for organic roasted peanuts, so the fifth hypothesis for roasted peanuts is rejected (Table 3.5). Only 47% of participants fixated on the organic attribute for roasted peanuts. We conclude people who fixate more on the organic logo consider the organic attribute as more important and are willing to pay more for organic peanuts. None of the FC coefficients of product origin or NCC impact WTP.

The FC coefficient of organic is not significant for salad mix (Table 3.5). Interestingly, more fixations on the "all natural" attribute decreases participants' WTP for salad mix. None of the FC coefficients for the product origin are significant. More fixations on the NCCs increase participants' WTP for the salad mix. The fifth hypothesis is rejected for salad mix.

Discussion

Participants are willing to pay a premium for organic apple juice and salad mix. The results are consistent with previous research that consumers are willing to pay more for organic foods (Hu et al., 2011; Magnusson et al., 2001). One potential explanation is consumers perceive organic products as being better for personal and environmental health. Consequently, they are willing to pay a premium for organic apple juice and salad mix.

Participants are also willing to pay more for local and domestic apple juice when compared to imported apple juice. Participants' preference for local and domestic apple juice may be due to preferences for local and domestic products due to safety concerns (Kloeckner et al., 2010; Lusk et al., 2006; Stolzenbach et al., 2013). Or the negative press about imported apple juice from China (The New York Times, 2013). Consequently, local and domestic products are viewed as safer and of higher quality when compared to imported products.

Some of the tobit model results using dummy variables to measure the product attributes are different from those using FC on product attributes. Differences exist between the apple juice product origin dummy variable results and FC results. The coefficients for the dummy variables local and domestic are significant for apple juice (Table 3.4), but the FC coefficients for local and domestic are not significantly different (Table 3.5). However, the FC on import significantly and negatively affects participants' WTP for apple juice. The results are partially explained by participants' familiarity with domestic food production and U.S. safety regulations (Kloeckner et al., 2010; Krissoff et al., 2004; Loureiro and Umberger, 2005; Lusk et al., 2006; Stolzenbach et al., 2013). Greater familiarity results in quicker understanding with fewer fixations. Participants

did not need to fixate on local or domestic as frequently to decipher the meaning and value of the attributes. The significant negative impact of FC of import on WTP may be attributed to safety concerns related to imported products as discussed earlier. We conclude local and domestic attributes are easier for consumers to understand, process, and place a value on for apple juice.

For roasted peanuts, the dummy variable organic is not significant but the FC coefficient on organic significantly affects participants' WTP for roasted peanuts (Tables 3.4 and 3.5). Since consumers fixate on traits that are important to them (Pieters and Wedel, 2007), we infer that participants who fixate more on the organic logo view organic production as more important and consequently value organic roasted peanuts more than non-organic roasted peanuts.

For salad mix, the "all natural" dummy variable coefficient is not significant; however, the FC coefficient for "all natural" is negative and significant (Tables 3.4 and 3.5). People tend to fixate more on information that is difficult to understand (Ares et al., 2013; Loftus and Mackworth, 1978; Mackworth and Morandi, 1967). The results likely reflect consumer confusion about what "all natural" means (Verbeke, 2010). A second possible explanation is that salad mix is already a natural product with little processing. Participants may have viewed the "all natural" attribute as not credible, misleading, or a marketing stunt (as discussed by Verbeke, 2010). Consequently, greater fixations on "all natural" results in a decreased WTP bid.

The coefficient for the dummy variable NCC is not significant for salad mix (Table 3.4) but the FC coefficient for NCC is significant (Table 3.5). Ares et al. (2013) found more visual fixations occur on attributes related to the healthiness of a product.

Since NCC are often associated with increased health benefits (Kozup et al., 2003), participants likely fixate more on the salad mix NCC because they need to process the NCC more to determine their WTP bids.

The study provides insights on how product attributes and visual attention to those attributes impact consumer WTP. Growers and processors could benefit from exploring the feasibility of producing the attributes consumers favor. For instance, there is potential demand for domestic, local, organic, and "all natural" apple juice. Also, the roasted peanuts industry and industry organizations (such as the National Organic Standards Board or the American Peanut Council) could explore the potential for organic peanut production in the future because currently the availability of organic peanuts is limited. Retailers could then benefit from developing in-store and point of purchase promotions to improve the visibility of these value-added attributes. For example, the health benefits of salad mix could be promoted by retailers and processors using in-store and point of purchase promotional strategies.

Conclusion

Consumers are bombarded by product information and determining the impact of information on consumer product choices is difficult. The current study investigates the impact of consumers' visual attention on their WTP for minimally processed horticultural products with varying production methods, origins, and nutrient content claims. Experimental auctions were combined with eye-tracking technology to explore how consumers' visual attention impact their WTP for various products attributes.

Participants are willing to pay more for organic, natural, local and domestic attributes on apple juice and salad mix, but not for roasted peanuts. The results are consistent with previous research on consumer preferences for production methods and origin (Hu et al., 2011; Magnusson et al., 2001). Producers and retailers could benefit from exploring the potential of producing and selling apple juice and salad mix with these attributes.

Participants' fixations on product attributes affect their WTP. Participants fixate on attributes that are related to the task of determining WTP bids (similar to Land et al., 1999). More fixations also occur on attributes that are important or difficult to understand (Land et al., 1999; Pieters and Wedel, 2007). Retailers and processors could benefit from using point of purchase promotions to highlight the attributes whose values are increased by more fixations. Additionally, attribute order does not impact participants' WTP bids. Therefore, the presence of the attributes rather than the location of the attributes impacts consumer WTP bids.

The presented research has potential to assist industry professionals, consumers and researchers as they develop, promote, and purchasing products. Industry professionals (breeders, growers, producers, retailers, etc.) could benefit as they produce and develop new products. Consumers benefit from having products with their preferred attributes. The study also proposes a new and exciting research method of combining eye-tracking technology and experimental auctions to understand how visual attention to product attributes affect consumer preferences and WTP.

Table 3.1. Products, attributes and attribute levels (production method, product origin, NCC) used to develop 47 different product labels for an experimental auction and eye-tracking experiment conducted in Minnesota in 2012.

	Attribute Levels		
Product	Production Method	Product Origin[z]	NCC
Apple juice	All natural Organic No label	Product of the U.S.A. Product of China[y] Minnesota Grown	Vitamin C enriched Naturally high in vitamin C No label
Roasted peanuts	All natural Organic No label	Product of the U.S.A. Product of Canada[x] Minnesota Grown	Low in sodium No label
Salad mix	All natural Organic No label	Product of the U.S.A. Product of Mexico[w] Minnesota Grown	High in fiber No label

[z] Countries used for the imported origin labels were based on USDA import statistics.
[y] In 2010, China accounted for 78.4% (by wholesale value) of all apple juice imported to the U.S. (ERS – USDA, 2012c).
[x] In 2011, Canada accounted for 46% (by wholesale value) of all groundnut (peanut) imports to the U.S. (ERS – USDA, 2012b).
[w] In 2011, Mexico accounted for 84.2% (by wholesale value) of all non-head fresh or chilled lettuce imports to the U.S. (ERS – USDA, 2012a).

Table 3.2. Post-experiment survey questions for an experimental auction and eye-tracking experiment exploring consumer interest and WTP for processed horticulture products, from a consumer preference study conducted in Minneapolis-St. Paul, Minnesota in 2012.

	Questions	Answer options
1	As a consumer, if you were given the option to buy processed horticultural products (for instance fruit/vegetable juice, salad mixes, mixed nuts, tomato or apple sauce, etc.) from the following locations, which would you prefer? *(Please check all that apply.)*	a. China b. Argentina c. Chile d. Brazil e. Canada f. Mexico g. Vietnam h. Thailand i. Peru j. Israel k. Guatemala l. U.S. m. Minnesota n. Other: _____
2	What is your reason for selecting the location in the previous question? *(Please check all that apply.)*	a. The product is safer b. Stricter production regulations c. Better flavor / taste d. More environmentally-friendly production process e. Decreased transportation miles f. Less pesticide residue on products g. More familiarity with that location's product h. Lower price i. Better quality j. Lower carbon footprint / greenhouse gas emissions during production k. More nutritious l. Products have longer shelf-life m. Other: _____
3	How often do you buy food products labeled as "all natural" when the options	a. Always b. Most times c. Sometimes

	are available? *(Check one.)*	d. Seldom e. Never
4	How often do you buy organic products when they are available? *(Check one.)*	a. Always b. Most times c. Sometimes d. Seldom e. Never
5	How much do you agree with the following statements when considering "all natural" and organic grocery products? *(1=strongly disagree; 7=strongly agree)*	a. "Seeing that a product is "all natural" is very important to me." b. "I get confused about the difference between organic and "all natural."" c. "I'm not sure what "all natural" means." d. ""All natural" labels mean the food is minimally processed." e. "I am skeptical about products labeled "all natural."" f. "I believe organic production methods protect the environment." g. "I believe organic products are healthy for me."
6	Do you have children under the age of 12 living in your household? *(Check one.)*	a. Yes b. No
7	In what year were you born?	a. _____
8	What is the highest level of education you have completed? *(Check one.)*	a. Some high school or less b. High school diploma c. Some college d. College diploma e. Some graduate school f. Graduate degree g. Other: _____
9	What is your gender? *(Check one.)*	a. Male b. Female
10	What is your relationship	a. Not married / single b. In a relationship

	status? *(Check one.)*	c. Married d. Divorced / separated e. Widowed
11	How many people live in your household? Include yourself, your spouse, and any dependents. Do not include your roommates.	a. _____
12	Please indicate the total amount of income earned in 2011 by the people in your household.	a. _____
13	What is your current employment status? *(Check one.)*	a. Full time b. Part time c. Student d. Retired e. Unemployed f. NA

Table 3.3. Summary statistics (variable, description, sample mean ± s.e., the 2011 Minnesota census mean) for socio-demographic variables of participants in an experimental auction and eye-tracking study conducted in Minnesota in 2012 (n=98).

Variable	Description	Mean±s.e.	2011 Minnesota Census Mean[z]
Weekly grocery budget	Amount spent on groceries in one week (US dollars)	91.45 ± 50.98	116.52[y]
Age	Age of participant (years)	51.434 ± 14.497	36.90
Less than 12	Participant has a child <12 years old in household (1=yes, 0=no)	0.184 ± 0.388	n/a
Household	Number of people living in the household (includes spouse and dependents, does NOT include roommates)	2.627 ± 1.508	2.46
Education	Level of education 1= some high school or less 2= high school diploma 3= some college 4= college diploma 5= some graduate school 6= graduate degree	3.686 ± 1.435	High school graduate
Income	Total amount of income earned in 2011 by household	51.966 ± 33.046	58.58
Gender	1=male, 0=female	0.272 ± 0.445	0.50
Relationship status	1= in a relationship or married, 0= single, divorced or widowed	0.641 ± 0.480	n/a
Employment	1=employed full time or part time, 0=not employed, student, retired, NA	0.452 ± 0.500	n/a

[z] (U.S. Census Bureau, 2013)

[y] The weekly grocery budget is a U.S. average since the Minnesota mean was not available (Food Market Institute, 2013).

Table 3.4. Tobit model coefficient estimates (coefficient ± S.E.) for Minnesota consumers' WTP for production method, origin, and NCC on apple juice, roasted peanuts, and salad mix from an experimental auction conducted in 2012 (n=98). Note: A higher coefficient indicates higher WTP when compared to the base variable.

Variable	Apple juice coefficient[z]	Roasted peanut coefficient[z]	Salad mix coefficient[z]
Organic	0.190 ± 0.086**	0.152 ± 0.136	0.312 ± 0.112***
Natural	0.109 ± 0.096	0.180 ± 0.131	0.068 ± 0.106
Conventional	Base	Base	Base
Local	0.767 ± 0.093***	0.086 ± 0.127	0.416 ± 0.109***
Domestic	0.628 ± 0.102***	0.023 ± 0.139	0.195 ± 0.106*
Import	Base	Base	Base
Enriched	0.139 ± 0.090	---	---
Naturally high	0.100 ± 0.097	---	---
NCC	---	0.003 ± 0.114	0.112 ± 0.089
No NCC	Base	Base	Base
Socio-demographics			
Age	-0.157 ± 0.0399***	-0.218 ± 0.058***	-0.374 ± 0.048***
In relationship	-0.156 ± 0.0400***	-0.194 ± 0.058***	-0.087 ± 0.047*
Less than 12	-0.033 ± 0.0439	0.280 ± 0.063***	-0.132 ± 0.052**
Gender	0.058 ± 0.0664	0.002 ± 0.087	-0.003 ± 0.072
Income	-0.133 ± 0.0710*	0.153 ± 0.092*	-0.141 ± 0.071*
Household	0.207 ± 0.0453***	-0.057 ± 0.066	0.191 ± 0.055***
Education	-0.036 ± 0.0384	-0.196 ± 0.055***	-0.094 ± 0.045**
Interaction effects			
Domestic x *income*[y]	0.093 ± 0.0542*	-0.010 ± 0.077	0.049 ± 0.061
Local x *income*[y]	0.143 ± 0.0524**	-0.003 ± 0.071	0.075 ± 0.063
Local x *gender*[x]	-0.072 ± 0.0504	-0.008 ± 0.069	-0.107 ± 0.060*
Domestic x *gender*[x]	-0.013 ± 0.0521	-0.0055 ± 0.075	-0.146 ± 0.058**
Constant	1.651 ± 0.0982***	2.335 ± 0.139***	2.071 ± 0.101***

Number of obs.	972	675	684
Log likelihood	-1480.451	-1150.075	-1044.193
Pseudo R2	0.046	0.031	0.063

[z] ***, **, * significant at $P \leq 0.001$, 0.050 or 0.100 respectively.

[y] Interaction effect between origin and participant's 2011 household income.

[x] Interaction effect between origin and participant's gender.

Table 3.5. Tobit model coefficient estimates (coefficient ± S.E.) of the impact of fixation count (FC)[z] on Minnesota participants' WTP for production method, origin, and NCC on apple juice, roasted peanuts, and salad mix, evidence from an eye-tracking study and experimental auction conducted in 2012 (n=93).

Variable	Apple juice coefficient[yx]	Roasted peanuts coefficient[x]	Salad mix coefficient[x]
FC_Organic	0.906 ± 0.200***	0.324 ± 0.144**	0.024 ± 0.158
FC_Natural	0.184 ± 0.082*	-0.164 ± 0.149	-0.348 ± 0.138**
FC_Local	0.099 ± 0.104	-0.077 ± 0.067	-0.067 ± 0.091
FC_Domestic	-0.105 ± 0.086	0.121 ± 0.105	0.024 ± 0.111
FC_Import	-0.309 ± 0.095***	0.023 ± 0.100	-0.074 ± 0.102
FC_Enriched	0.115 ± 0.075	---	---
FC_Naturally high	-0.049 ± 0.047	---	---
FC_NCC[w]	---	0.077 ± 0.111	0.406 ± 0.117***
Socio-demographics			
Age	-0.121 ± 0.048*	-0.202 ± 0.063***	-0.368 ± 0.054***
In relationship	-0.172 ± 0.044***	-0.162 ± 0.059***	-0.066 ± 0.049
Less than 12	-0.040 ± 0.048	0.263 ± 0.065***	-0.114 ± 0.055**
Gender	0.034 ± 0.039	-0.016 ± 0.054	-0.149 ± 0.044***
Income	0.005 ± 0.046	0.117 ± 0.064*	-0.088 ± 0.054
Household	0.214 ± 0.047***	-0.069 ± 0.069	0.187 ± 0.061***
Education	-0.070 ± 0.042*	-0.176 ± 0.056***	-0.121 ± 0.049**
Constant	2.226 ± 0.066***	2.374 ± 0.090***	2.413 ± 0.079***
Number of obs.	972	675	684
Log likelihood	-1502.395	-1145.699	-1053.679
Pseudo R2	0.032	0.034	0.054

[z] FC (fixation counts) are the number of eye fixations in each area of interest (AOI).

[y] The coefficients indicate the impact of one fixation on participants' WTP for the product. For instance, if participants' fixated on organic one additional time they would be willing to pay $0.91 more for the apple juice.

[x] ***, **, * significant at $P \leqslant 0.001$, 0.050 or 0.100 respectively.

[w] The nutrient content claim (NCC) for roasted peanuts was 'low in sodium' and the nutrient content claim (NCC) for salad mix was 'high in fiber.'

Apple Juice Image

Salad Mix Image

Roasted Peanuts Image

Figure 3.1. Example images of apple juice, salad mix and roasted peanut products and product labels used to investigate consumer preferences and visual attention to production method, origin, and nutrient content claim in a study conducted in Minnesota in 2012. Note: NCC = nutrient content claim; Prod. method = production method; COOL = country of origin label.

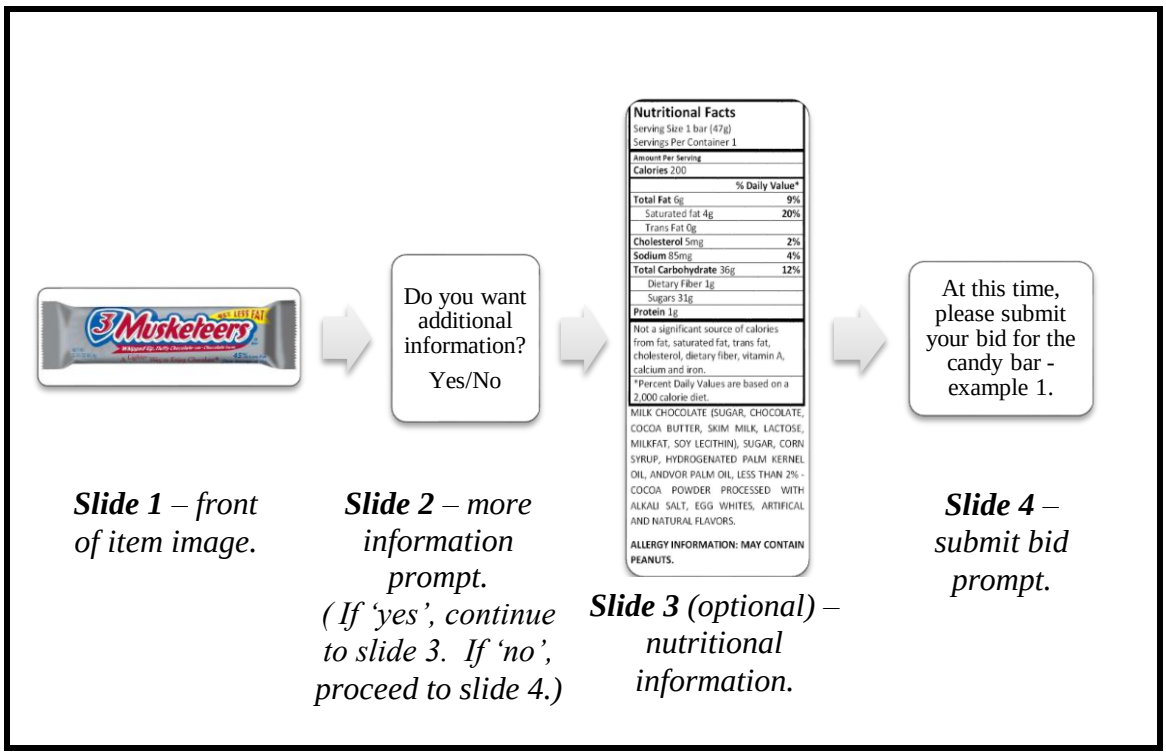

Figure 3.2. Example of the slide order used in an experimental auction and eye-tracking experiment conducted in Minnesota in 2012. A candy bar was used as an example to educate participants about the experimental auction mechanism and calibrate the eye-tracking camera to each individual's eyes.

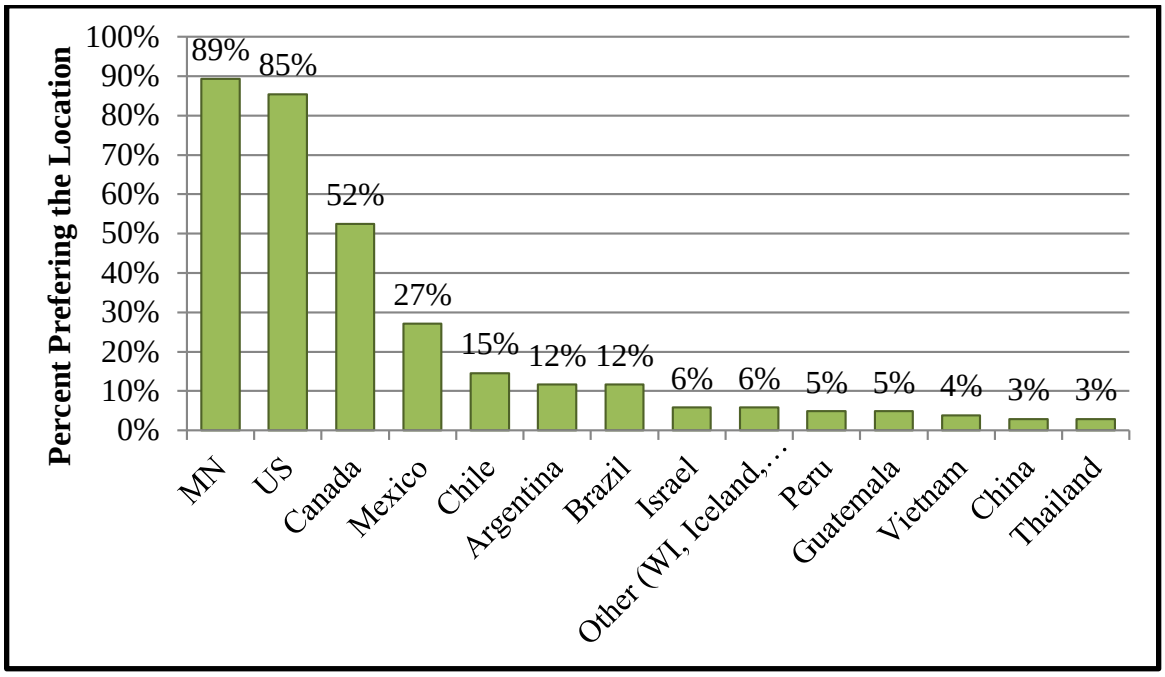

Figure 3.3. Percentage of participants preferring processed horticultural products from different locations (n=98). Participants were asked to check all that apply. The different locations were based on USDA import data[z] on apple juice, peanuts (groundnuts), and salad mix (non-head lettuce).

[z] The list of 14 locations was developed based on USDA import data for apple juice, roasted peanuts, and salad mix (ERS – USDA, 2012a; ERS – USDA, 2012b; ERS – USDA, 2012c). Minnesota (MN) was used as a 'local' option.

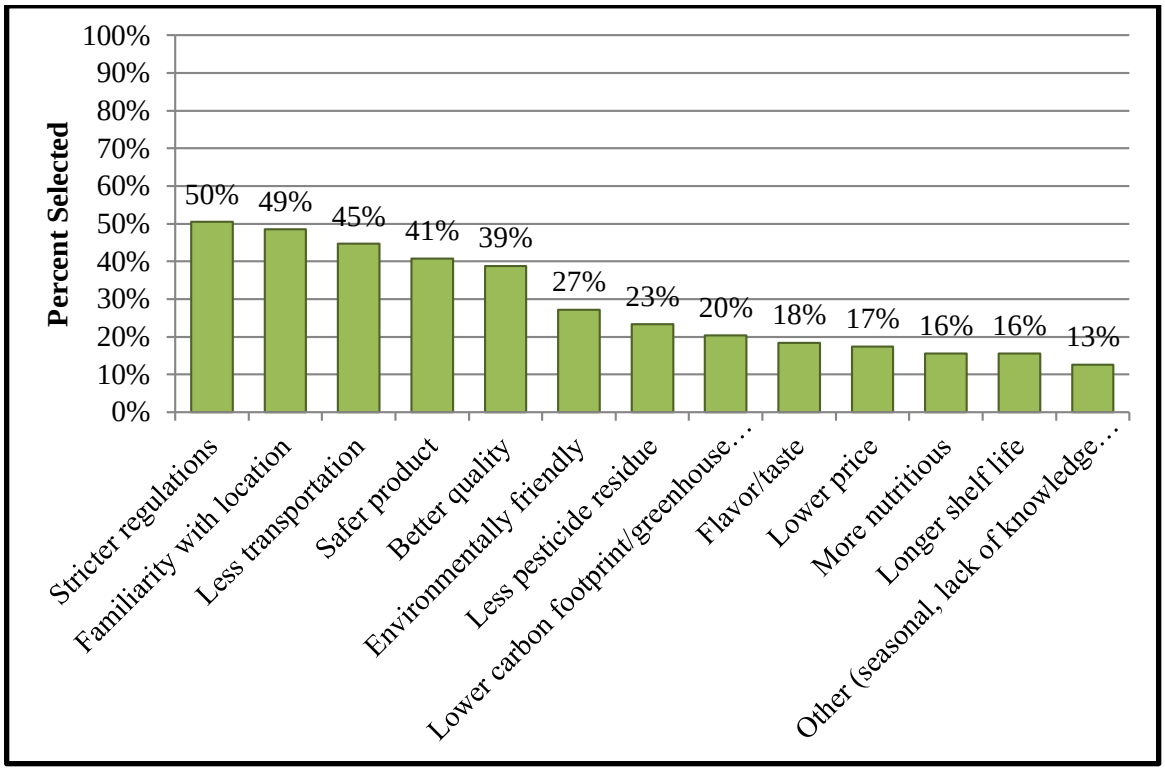

Figure 3.4. Frequency of participants' reasons for selecting their preferred locations of origin for the processed horticulture products (n=98).

CHAPTER 4: Conclusions

Competition between firms is intense. Consumers have many product alternatives to select from and are highly heterogeneous in their preferences. In order to reduce risk, firms need to be aware of consumer interest when contemplating new marketing strategies. However, predicting consumer behavior is challenging. Prior research utilized choice experiments and experimental auctions to investigate consumer behavior. Firms benefit from consumer behavior research due to reduced risk. Additionally, consumer behavior benefits consumers because firms develop products that better align with their preferences.

Chapter 2 explores the use of longevity information and guarantees on cut flower arrangements as a means of adding value to existing arrangements. The elements examined are consumer willingness to pay (WTP), specific vase life longevity lengths, and the presence of a guarantee. Arrangement use and type were also investigated. We provide a breakdown of consumer segments. The analysis brings together all of these elements to indicate the market potential and consumers' valuation for longevity indicators and guarantees in the marketplace.

Three trends emerged from our research on consumer preferences for longevity information and guarantees on cut flower arrangements. First, longevity information and guarantees are valued by the majority of consumers. These attributes assist consumers in selecting products by providing information about what the consumer can expect from the arrangement. Consequently, longevity indicators and guarantees have potential to

improve consumer satisfaction with their purchases. Consumers are also willing to pay a premium to obtain these quality assurance measures.

Second, consumers value longevity information the most and are willing to pay the greatest premium for the longest lasting arrangements. Intuitively, our results make sense since cut flowers are highly perishable and a greater longevity is equivalent to having a longer period of enjoyment.

Third, three consumer segments exist. The segments value longevity and guarantees differently. However, the majority of the segments prefer longevity information and guarantees. We conclude floral retailers could utilize longevity indicators and guarantees to improve consumer satisfaction and confidence when purchasing cut flower arrangements. However, a cost analysis would be beneficial to estimate the return on investment of using these value-added attributes.

Chapter 3 examines the use of production methods, origin, and nutrient content claim (NCC) labels on minimally processed horticultural products as a means of adding value to the products. Consumer WTP and visual attention to the attributes was also explored. An experimental auction was paired with eye-tracking technology to determine consumers' WTP and visual attention. Three minimally processed horticultural products were used, including apple juice, roasted peanuts, and salad mix.

Three trends emerged from our research on consumer WTP and visual attention to product attributes on minimally processed horticultural products. First, participants value organic production methods for apple juice and salad mix. Organic production

signifies greater personal and environmental health to many consumers. Consequently, consumers are willing to pay a premium to obtain these benefits.

Second, consumers value apple juice and salad mix from local and domestic origins more than products from foreign countries. Greater consumer interest in local and domestic has come from consumer concerns regarding food safety and quality. Consequently, local and domestic producers may benefit from promoting the origin of their products.

Third, correlations exist between visual attention and WTP bids. More fixations to imported apple juice decreased participants' WTP. One potential explanation is recent negative food safety publicity for apple juice imported from China. Interestingly, increased visual attention to the organic logo on roasted peanuts increases participants WTP. We conclude participants who value organic products visually fixate on the organic logo on roasted peanuts. Consequently, more fixations result in a higher WTP bid. For salad mix, more visual attention to "all natural" decreased WTP bids for while more fixations increased WTP for the NCC. The decreased WTP for "all natural" salad mix may reflect consumer confusion about what "all natural" really means. Consequently, the participant fixate on the attribute more to determine the meaning. However, they bid lower to reflect their skepticism. Similarly, participants may have fixated more on the NCC to decipher its meaning; however, in this instance, they saw the value (i.e. potential health benefits) and therefore bid a higher amount to reflect that improved value. We conclude, participants fixated more on attributes that are important

or difficult to understand. Our results are consistent with previous studies (Bialkova and van Trijp, 2011; Meissner and Decker, 2010; Pieters and Wedel, 2007).

Both studies suggest some interesting questions and opportunities for future research. Specifically, for the longevity and guarantee on cut flower arrangements study:

1. A cost analysis could be conducted in order to fully realize businesses' risk and the potential return on investment for these value-added attributes.
2. To test the robustness of our results, our study could be repeated using different colored flowers, species, or arrangement designs. Would different species/colors/designs impact consumer preferences and WTP?
3. A similar study could be conducted but targeting specific occasions (e.g. Mother's Day, Easter, and so on). Would preferences and WTP vary for the specific occasions?
4. Lastly, in our results, the spenders cluster was not interested in the longevity indicators or guarantees, yet they had the highest total WTP. What attributes attract consumers in this cluster? What could retailers do to draw in these consumers?

For the minimally processed horticultural products study, the experimental auction results are fairly straightforward. However, the eye-tracking results put forward a whole new set of questions, including:

1. What caused the differences between products? Did food allergies impact their preferences for roasted peanuts? What about household preferences for or against different products (allergies, health concerns, etc.)? Are the current retail

prices for these products deterrents in consumer purchasing behavior? Does frequency of purchase impact participants' preferences? There are many follow up questions related to the individual product results found in our study.

2. There are also many questions when one considers the potential impact of prior consumer knowledge and assumptions related to the product's origin. For instance, what is the existing consumer knowledge regarding specific import countries? How much impact does that knowledge have on consumers WTP bids and purchasing decisions? Are there correlations between strong positive/negative assumptions and visual attention to the import information? There is a lot of potential to investigate correlations between associations with origin locations and visual attention/processing.
3. Due to increased consumer interest in local produce, there is potential to investigate COOL and local branding strategies using eye-tracking analysis.
4. Similarly, the use of branding logos/images versus text is an area for further exploration. For instance, researchers could explore the organic logo and Minnesota Grown logo versus using text to communicate the product's production method and origin. How does the visual attention to logos versus text differ? What are the impacts on consumers' WTP? How much is a pictorial brand logo worth to consumers? Should local companies develop a pictorial brand logo? How do the results vary by scale (national [USDA organic logo], regional [MN Grown logo], or local [individual farm logo])?

5. Lastly, there are a lot of opportunities to investigate the correlations between positive/negative sentiments towards products and product attributes, cognitive processing, and consumers' visual attention. These connections are not well understood and eye-tracking analysis can be used to examine these relationships.

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APPENDIX A: University of Minnesota – Twin Cities IRB Study Exemption Notification for the Study on Consumer Preferences for Longevity Indicators and Guarantees on Cut Flower Arrangements.

From: <irb@umn.edu>
Date: Mon, Apr 18, 2011 at 10:13 AM
Subject: 1104E98416 - PI Yue - IRB - Exempt Study Notification
To: yuechy@umn.edu

The IRB: Human Subjects Committee determined that the referenced study is exempt from review under federal guidelines 45 CFR Part 46.101(b) category #2 SURVEYS/INTERVIEWS; STANDARDIZED EDUCATIONAL TESTS; OBSERVATION OF PUBLIC BEHAVIOR.

Study Number: 1104E98416
Principal Investigator: Chengyan Yue

Title(s):
The effects of longevity information and guarantees on consumer preferences for cut flowers

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This e-mail confirmation is your official University of Minnesota RSPP notification of exemption from full committee review. You will not receive a hard copy or letter.

This secure electronic notification between password protected authentications has been deemed by the University of Minnesota to constitute a legal signature.

The study number above is assigned to your research. That number and the title of your study must be used in all communication with the IRB office.

Research that involves observation can be approved under this category without obtaining consent.

SURVEY OR INTERVIEW RESEARCH APPROVED AS EXEMPT UNDER THIS CATEGORY IS LIMITED TO ADULT SUBJECTS.

This exemption is valid for five years from the date of this correspondence and will be

filed inactive at that time. You will receive a notification prior to inactivation. If this research will extend beyond five years, you must submit a new application to the IRB before the study's expiration date.

Upon receipt of this email, you may begin your research. If you have questions, please call the IRB office at (612) 626-5654.

You may go to the View Completed section of eResearch Central at http://eresearch.umn.edu/ to view further details on your study.

The IRB wishes you success with this research.

We have created a short survey that will only take a couple of minutes to complete. The questions are basic but will give us guidance on what areas are showing improvement and what areas we need to focus on:
https://umsurvey.umn.edu/index.php?sid=94693&lang=um

APPENDIX B: Scenario Design for Longevity Information and Guarantees on Cut Flower Arrangements

Table B.1 The experimental design for 24 cut flower arrangement scenarios using a fractional factorial design conducted using JMP 11 Software (SAS Institute, Inc., Cary, NC).

Scenario Number	Arrangement Type[z]	Use[y]	Attribute	Choice A	Choice B
1	Mixed	Self	Longevity[x]	5-7 days	8-10 days
			Guarantee	No	Yes
			Price[w]	$34.99	$37.99
2	Mixed	Self	Longevity	5-7 days	11-14 days
			Guarantee	No	Yes
			Price	$34.99	$43.99
3	Mixed	Self	Longevity	11-14 days	5-7 days
			Guarantee	No	Yes
			Price	$43.99	$34.99
4	Mixed	Self	Longevity	11-14 days	8-10 days
			Guarantee	No	Yes
			Price	$37.99	$43.99
5	Mixed	Self	Longevity	8-10 days	11-14 days
			Guarantee	No	Yes
			Price	$37.99	$43.99
6	Mixed	Self	Longevity	5-7 days	8-10 days
			Guarantee	Yes	No
			Price	$37.99	$34.99
7	Single	Self	Longevity	5-7 days	8-10 days
			Guarantee	No	Yes
			Price	$7.99	$9.99
8	Single	Self	Longevity	5-7 days	11-14 days
			Guarantee	No	Yes
			Price	$7.99	$11.99
9	Single	Self	Longevity	11-14 days	5-7 days
			Guarantee	No	Yes
			Price	$11.99	$7.99
10	Single	Self	Longevity	11-14 days	8-10 days
			Guarantee	No	Yes
			Price	$9.99	$11.99
11	Single	Self	Longevity	8-10 days	11-14 days
			Guarantee	No	Yes
			Price	$9.99	$11.99
12	Single	Self	Longevity	5-7 days	8-10 days
			Guarantee	Yes	No
			Price	$9.99	$7.99
13	Mixed	Gift	Longevity	5-7 days	8-10 days

			Guarantee Price	No $34.99	Yes $37.99
14	Mixed	Gift	Longevity Guarantee Price	5-7 days No $34.99	11-14 days Yes $43.99
15	Mixed	Gift	Longevity Guarantee Price	11-14 days No $43.99	5-7 days Yes $34.99
16	Mixed	Gift	Longevity Guarantee Price	11-14 days No $37.99	8-10 days Yes $43.99
17	Mixed	Gift	Longevity Guarantee Price	8-10 days No $37.99	11-14 days Yes $43.99
18	Mixed	Gift	Longevity Guarantee Price	5-7 days Yes $37.99	8-10 days No $34.99
19	Single	Gift	Longevity Guarantee Price	5-7 days No $7.99	8-10 days Yes $9.99
20	Single	Gift	Longevity Guarantee Price	5-7 days No $7.99	11-14 days Yes $11.99
21	Single	Gift	Longevity Guarantee Price	11-14 days No $11.99	5-7 days Yes $7.99
22	Single	Gift	Longevity Guarantee Price	11-14 days No $9.99	8-10 days Yes $11.99
23	Single	Gift	Longevity Guarantee Price	8-10 days No $9.99	11-14 days Yes $11.99
24	Single	Gift	Longevity Guarantee Price	5-7 days Yes $9.99	8-10 days No $7.99

[z] Arrangement type included mixed arrangements ("mixed") where a variety of flowers were used and the flowers were arranged in a container and single species bunches ("single") where six red roses plus filler were bunched together.

[y] Use refers to whether the flowers were being purchased for oneself versus being purchased to be given to someone else as a gift.

[x] Longevity lengths were determined from previous research on consumer longevity expectations (Fanourakis et al., 2013; Regan et al., 2006; Regan et al., 2007; Regan et al., 2008; Särrkä et al., 2001; Teklic et al., 2003; Yue et al., 2009) and from consulting industry professionals.

[w] Price points were generated from industry recommendations from the wholesale supplier and from marketplace observations (i.e. florist, grocery, online and superstore observations).

APPENDIX C: University of Minnesota – Twin Cities IRB Study Exemption Notification for the 'Do consumers attend to product labels addressing production methods, product origin and health claims? An eye-tracking study'.

UNIVERSITY OF MINNESOTA

Twin Cities Campus

Human Research Protection Program
Office of the Vice President for Research

D528 Mayo Memorial Building
420 Delaware Street S.E.
MMC 820
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Office: 612-626-5654
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Website: http://research.umn.edu/subjects/

09/28/2011

Chengyan Yue
Horticulture
458 AlderH
1970 Folwell Ave
St Paul, MN 55108

RE: "Do consumers attend to product labels addressing production methods, product origin and health claims? An eye-tracking study"
IRB Code Number: **1108S03942**

Dear Dr. Yue:

The Institutional Review Board (IRB) received your response to its stipulations. Since this information satisfies the federal criteria for approval at 45CFR46.111 and the requirements set by the IRB, final approval for the project is noted in our files. Upon receipt of this letter, you may begin your research.

IRB approval of this study includes the consent form and recruitment letter, both received September 21, 2011. Please note, all additional flyers or postings that you will use in this study will need to receive IRB approval before posting.

The IRB would like to stress that subjects who go through the consent process are considered enrolled participants and are counted toward the total number of subjects, even if they have no further participation in the study. Please keep this in mind when calculating the number of subjects you request. This study is currently approved for 150 subjects. If you desire an increase in the number of approved subjects, you will need to make a formal request to the IRB.

For your records and for grant certification purposes, the approval date for the referenced project is September 19, 2011 and the Assurance of Compliance number is FWA00000312 (Fairview Health Systems Research FWA00000325, Gillette Children's Specialty Healthcare FWA00004003). Research projects are subject to continuing review and renewal; approval will expire one year from that date. You will receive a report form two months before the expiration date. If you would like us to send certification of approval to a funding agency, please tell us the name and address of your contact person at the agency.

As Principal Investigator of this project, you are required by federal regulations to inform the IRB of any proposed changes in your research that will affect human subjects. Changes should not be initiated until written IRB approval is received. Unanticipated problems or serious unexpected adverse events should be reported to the IRB as they occur.

The IRB wishes you success with this research. If you have questions, please call the IRB office at 612-626-5654.

Sincerely,

Christina Dobrovolny, CIP
Research Compliance Supervisor
CD/ks

APPENDIX D: Scenario Design for Production Method, NCC, and Origin on Apple Juice, Roasted Peanuts, and Salad Mix

Table D.1. The experimental design for the attributes on the labels of processed horticulture products scenarios using a fractional factorial design. The products were randomized and each participant was either exposed to version 1 or 2.

Version	Product	Production Method	COOL	NCC
1	Apple Juice	Natural	Domestic	No
1	Apple Juice	Conventional	Domestic	No
1	Apple Juice	Natural	Imported	Enriched vitamin C
1	Apple Juice	Organic	Local	Naturally high vitamin C
1	Apple Juice	Organic	Local	No
1	Apple Juice	Organic	Local	Enriched vitamin C
1	Apple Juice	Organic	Import	No
1	Apple Juice	Conventional	Import	Enriched vitamin C
1	Apple Juice	Natural	Domestic	Naturally high vitamin C
2	Apple Juice	Organic	Domestic	Naturally high vitamin C
2	Apple Juice	Conventional	Domestic	Naturally high vitamin C
2	Apple Juice	Organic	Domestic	No
2	Apple Juice	Organic	Import	Enriched vitamin C
2	Apple Juice	Natural	Local	Naturally high vitamin C
2	Apple Juice	Conventional	Local	No
2	Apple Juice	Natural	Local	Enriched vitamin C
2	Apple Juice	Conventional	Import	No
2	Apple Juice	Conventional	Domestic	Enriched vitamin C
2	Apple Juice	Organic	Import	Naturally high vitamin C
1	Peanuts	Organic	Local	No
1	Peanuts	Conventional	Import	Low sodium vitamin C
1	Peanuts	Organic	Domestic	No
1	Peanuts	Natural	Import	Low sodium vitamin C
1	Peanuts	Natural	Local	Low sodium vitamin C
1	Peanuts	Conventional	Domestic	No
1	Peanuts	Natural	Import	No
2	Peanuts	Conventional	Local	Low sodium vitamin C
2	Peanuts	Conventional	Domestic	Low sodium vitamin C

2	Peanuts	Organic	Import	Low sodium vitamin C
2	Peanuts	Natural	Local	No
2	Peanuts	Natural	Domestic	No
2	Peanuts	Conventional	Import	No
2	Peanuts	Organic	Local	Low sodium
1	Salad mix	Organic	Domestic	No
1	Salad mix	Conventional	Local	High in fiber
1	Salad mix	Organic	Domestic	High in fiber
1	Salad mix	Natural	Import	High in fiber
1	Salad mix	Conventional	Local	No
1	Salad mix	Natural	Domestic	No
1	Salad mix	Conventional	Import	No
2	Salad mix	Organic	Import	High in fiber
2	Salad mix	Natural	Domestic	High in fiber
2	Salad mix	Conventional	Import	High in fiber
2	Salad mix	Organic	Local	No
2	Salad mix	Conventional	Domestic	No
2	Salad mix	Natural	Import	No
2	Salad mix	Natural	Local	High in fiber