2008

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School of Environmental Science & Management
UNIVERSITY OF CALIFORNIA, SANTA BARBARA

Helping Consumers Navigate Green: Creating the Definitive Criteria for Consumers Products and Services

A Master's Project for the Donald Bren School of Environmental Science and Management

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Acknowledgements

We would like to thank the following individuals for their contributions and assistance throughout this process:

Gay Browne and the staff at Greenopia

Magali Delmas, our intrepid faculty advisor

The Bren administrative staff

All the people who took the time to fill out our survey

Abstract

While there have been numerous attempts at environmental labeling, issues such as legitimacy, misrepresentation, and shifting consumer preferences have impeded large-scale acceptance and implementation of such labels. For this project, we sought to gain a more comprehensive understanding of consumers' preferences of various environmental criteria when making eco-friendly shopping decisions. We designed and conducted a survey aimed at assessing the importance respondents assigned to seven environmental criteria when choosing a business. We found that consumers rated all seven environmental criteria as important, and this was true in all three business sectors. We concluded that organizations reporting the environmental practices of businesses to consumers should include a wide array of environmental criteria in their evaluative scheme. If such organizations aim to reflect consumer preferences alone, these criteria should be weighted fairly evenly. However, because we found that criteria with similar environmental implications – namely, organic certification and toxicity -- were valued somewhat differently, consumer understanding of the criteria may be incomplete. Because of this, other factors should possibly be included in the design of any weighting scheme, such as the environmental impact of each criterion.

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Executive Summary

For this project, we sought to gain a more comprehensive understanding of consumers' preferences of various environmental criteria when making shopping decisions. We designed and conducted a survey aimed at assessing the importance respondents assigned to seven environmental criteria when choosing a business. We asked them to rate the importance of organic certification, toxicity, water efficiency, energy efficiency, local production, and environmentally-friendly packaging when choosing a business in each of three sectors (food, service, and retail). We also assessed respondents' demographic, behavioral, and attitudinal characteristics. To evaluate the latter, we employed two "scales" to measure aspects of respondents' outlook; we used a modified version of Dunlap *et al's* (2000) "New Ecological Paradigm" (NEP) scale to measure respondent's environmental worldview, and an altruism scale designed by Clark, *et al* (2003), based on the Schwartz (1977) norm-activation model, to gauge respondents' altruistic tendencies. We distributed the survey electronically to eight different populations from various parts of California and several western states, as well as to a paid group of respondents from across the country. In all, over 1000 people responded to our survey.

We found that consumers rated all seven environmental criteria as important, and this was true in all three business sectors. Although toxicity was assigned the highest importance and organic certification the lowest, the differences in ratings were small. We then employed a general linear model regression to assess which demographic characteristics were associated with valuing the various criteria as important. We found that being female, older, and scoring higher on both the NEP scale and the altruism scale were significantly and positively associated with placing a higher level of importance on all seven of the environmental criteria.

We concluded that organizations that wish to evaluate the environmental practices of businesses, and convey such information to consumers, should include a wide array of environmental criteria in their evaluative scheme. If such organizations aim to reflect consumer preferences alone, these criteria should be weighted fairly evenly. However, because we found that criteria with similar environmental implications were valued differently, consumer understanding of the criteria may be incomplete, and other factors should perhaps be included in the design of any weighting scheme, such as the environmental impact of each criterion.

Introduction

In recent years, green products have been gaining popularity and now represent a significant share of the marketplace. For example, consumers increased their expenditure on organic foods from $3.8 billion in 1997 to $16.7 billion in 2006 (Organic Trade Association, 2006). It is estimated that green products as a whole account for 9.5% of all new-product introductions in the United States over the past decade (Ottman, 1998), and analysts have dubbed green markets as "the next big thing" in investment and growth opportunities (Murphy, 2003). Greenopia, creator of a green shopping guide, was founded upon the premise that consumers would benefit from a guide designed to clearly distinguish those companies whose practices and products are truly green from those that are not. The focus of our project was to identify some characteristics of green consumers, specifically what environmental impact categories they value when choosing businesses to frequent. The findings will inform Greenopia's rating methodology when publishing future guides so that they reflect what consumers consider important.

An ecolabel that captures and communicates the environmental criteria that consumers are truly interested in could distinguish itself from other labels, as well as potentially elicit a greater positive response from consumers. In the period between 1989 and 1997, the number of officially recognized ecolabels increased from 12 to 32 in the U.S. (Pedersen, 2005). In spite of this increase, only a few ecolabels are well-known and are embraced by consumers. Certain consumers have shown a strong preference for green products and may even be willing to pay a price premium (Wagner, 1997). Thus, it is important to give them the information they desire about the environmental characteristics of a product or service.

However, because consumers purchase environmental goods for varying reasons, an understanding of the motivations driving consumer purchases of eco-labeled products can help determine the environmental criteria to be used for the actual label. A label that carries the pertinent information and appeals to their actual interests will in turn benefit consumers. We designed and administered a survey to determine the importance consumers assign to various environmental criteria when selecting business establishments to support.

Objectives

Our project had the following objectives:

- Analyze literature to gain understanding of green markets and eco-labels
- Design survey to evaluate consumer perception of various environmental criteria for different sectors of local business economies
- Interpret findings and design criteria to reflect consumer preferences
- Gain understanding of what motivates consumers to buy "green" products

Literature Review

We conducted an extensive literature review to familiarize ourselves with extant research on consumer preferences for green products and services, as well as ecolabels in general. We began with a look at Life-Cycle Analysis (LCA) and International Organization for Standardization (ISO) guidelines for ecolabeling, to assess the failures and successes of the international ecolabeling effort. However, as the project progressed, we realized that these two areas were not pertinent to our project, and instead decided to focus more on consumer preferences, specifically as having been determined through surveys. A brief discussion of LCA, ISO, and international ecolabels follows, with a more comprehensive discussion in Appendix H. We then looked at the literature analyzing consumer reactions towards ecolabels to help us understand what consumers may value in an ecolabel and how we should approach its criteria/weight. Attention was also given to research involving consumer surveys.

Life-Cycle Analysis/ISO 14000

Although there have been numerous attempts to create an ecolabel that is widely embraced by consumers, few have managed to generate extensive support. Several obstacles to widespread ecolabel adoption can be clearly identified in the academic literature.

First, the source of the label is an important determinant of consumer trust in a label's validity. Several studies suggest that government certification of labels may increase consumer buy-in (Bostrom and Klintman, 2006; Klooster, Dan (2006); Noblet *et al*, 2006), but historically speaking, government oversight often takes too long to be truly effective (Raines, 1992). This is partially due to the fact that gathering the information required to make an ecolabel comprehensive and useful is a large and onerous task. This problem could be alleviated by simply making the companies report their own information, but this has not seen much success.

ISO 14000 utilizes a life cycle analysis (LCA) approach to standardize labeling procedures. Specifically, in ISO 14020, there are nine principles from which environmental labels should adhere. These are listed as follows (ISO 14000, 2006):

1. *Labels and declarations must be accurate, verifiable, relevant, and non-deceptive*
2. *Environmental attributes must be available to purchasers*
3. *Labels and declarations must be based on scientific methodology*
4. *Criteria for label/declaration must be available to all interested parties*
5. *Labels and declarations must take into account the life cycle of the relevant product or service*
6. *The administrative work must be limited to establishing conformance with criteria*
7. *Labels and declarations procedures and criteria must not create unfair trade restrictions or discrimination between domestic and foreign products or services*
8. *Labels and declarations procedures and criteria must not inhibit innovation*
9. *Labels and declarations standards and criteria must be developed by consensus.*

International Eco-Labeling

There have been several attempts to standardize labels to such an extent that they can be employed internationally, but many of the obstacles discussed above have precluded the universal success of any one label. Several instances highlight the tension between presenting too much information for consumers to digest, and presenting too little information for the label to be useful, or credible. There are numerous labeling schemes in Europe, yet "no single label covers all aspects of sustainability," according to the UK's Department for Environment, Food and Rural Affairs (DEFRA) (www.defra.gov.uk website, 2007). DEFRA also notes there are instances where a label does not address all the concerns of the consumer, and other areas where there is no labeling scheme in existence at all. Ecolabels can be self-assigned or awarded based on company self-reporting, or by independent third-party entities. For example, in the UK the Ethical Company Organization (ECO) claims to be the UK's only corporate-level Ethical Company Accreditation Scheme. Research teams analyze records of applicant companies based on 15 criteria regarding their treatment of animals, environment, and people. The Ethical Company Accreditation is awarded to the top 33% of companies in each individual sector. Those companies are then listed prominently in the Good Shopping Guide and on the ECO website, and are also allowed to use the ECO logo on their letterhead, advertising, emails, packaging, etc. The Good Shopping Guide is supposedly the "world's best selling ethical shopping reference book, providing clear and extensive ethical shopping ranks across 60 trade sectors" (www.thegoodshoppingguide.com website, 2007). The guide includes detailed brand/company tables from all consumer sectors.

Other countries have similar organizations in place: EcoLogo, a certification program run by the Canadian federal government certifying green products in over 120 categories; Eco-cert, a private company founded in France, which investigates and certifies natural and organic cosmetics in 80 different countries for shipment to Europe, the US, and Japan; and Eurogap, a private sector organization that certifies agricultural products from all over the world. In 2005 the International Association Natural Textile Industry (Germany), Soil Association (England), Organic Trade Association (US), and Japan Organic Cotton Association devised the Global Organic Textile Standard, based on a number of key criteria, including a majority composition of organic fibers, toxicity and biodegradability requirements, the absence of toxic heavy metals or formaldehyde, existence of environmental policies in the manufacturing sites, social criteria (based on ILO key criteria); and, on-site inspection and residue testing.

Service/Product Provider Surveys

To help inform the design of our survey, we analyzed past efforts to use surveys to gain a better understanding of consumer response to green products and ecolabels. We found that several of the studies directed their questions at producers rather than consumers to elucidate why companies may choose to participate in a labelling program. Sally Hays from the University of Oregon (www.pnrec.org, 1997) presented results of surveys given to both consumers and businesses regarding ecolabeling of those entities that take steps to reduce or avoid contamination of groundwater in three communities in Lane County, Oregon. The business

survey focused on the costs of the program and its effect on the willingness to participate. The paper concluded that the lower the cost to the business, the greater the willingness to participate. Additionally, the businesses were asked about customer willingness to pay; approximately half responded that they thought customers would be willing to pay an average premium of 11%, yet they also believed that a 10% increase in cost would result in a 17% decrease in profits and a 16% decrease in demand for the product. These results were close to the consumer responses. Over 30% of the businesses surveyed informed their customers that they were currently using environmentally friendly materials or processes; however, only 18.9% of the consumers believed this claim, revealing the need for a third-party certification.

In a survey of automobile purchasing practices, Noblet *et al* (2006) found that consumers do value the benefit of "green vehicles," yet a majority of producers are hesitant to participate in a program that would educate consumers about the environmental attributes of such vehicles. They report that consumers are also very skeptical of company claims about production, and that credible and reliable communication on behalf of agencies, NGOs, the government, or a reliable third party is necessary. The authors state that there has been no study indicating whether such a process changes customers' attitudes or purchasing practices, however. The study has two parts: an ecolabeling section that focuses on providing consumers with environmental information on the car at point-of-purchase, and an eco-marketing campaign piece focusing on educating consumers about the state of Maine's clean air campaign and the role of automobiles in pollution. They cite perceived inconvenience, risk, cost increases, or decrease in quality as barriers to eco-friendly purchasing. Additionally, previous studies have shown that women tend to make more eco-friendly purchases. From a marketing standpoint, the researchers found that provision/existence of a website added consumer credibility to the ecolabel, while providing a source of additional information.

Sammer and Wustenhagen (2006) examined the impact of the (mandatory) energy labeling strategy for appliances in the UK on consumer choices and willingness to pay (WTP). They based their study on the assumption that "brands and labels fulfill two main functions for consumers: They inform them about intangible product characteristics (information function, e.g. production inputs) and provide a value in themselves (value function, e.g. prestige)." When provided with a list of product features, 31.8% of consumers surveyed considered price to be the most important criterion, followed by extra equipment and energy consumption. The second most important was energy consumption for most respondents, followed by price and water consumption. The study also found that more customers declared the energy label itself to be more important in their purchasing decision than was energy consumption.

Surveys provide an important mechanism for understanding consumer motivation and response to ecolabels and green products. Several studies reported findings that consumers are more willing to trust labels that have been certified by a credible third party, and that price, quality, and convenience are cited most frequently as reasons not to purchase green products. It also seems that producers cite the high cost of participation as the main reason they avoid entering into an ecolabeling program.

Consumer Surveys

Many studies use surveys as a tool to quantify consumer response to green products and services. These will help inform the design and administration of our survey. A study conducted in Spain of the willingness of surveyed consumers to buy packages of cookies that included nutritional information revealed that most consumers were willing to pay extra to have that information (Loureiro *et al*, 2006). Though the researchers conducted personal interviews instead of an online survey, the article provides good information on what questions to ask consumers, how to conduct the survey, and a method in which to analyze the results. In addition to specific questions about cookie consumption, the survey also asked respondents about their shopping habits, food preferences, to what extent labels guided shopping practices, and socio-demographic characteristics. As far as analysis of the results, the focus of this study was on willingness to pay, and as a result the statistical analysis consisted primarily of probability and a determination of a log likelihood function. The researchers concluded with construction of a willingness-to-pay model.

A study conducted in 11 cities of consumers' awareness of and willingness to buy genetically modified (GM) foods gave similar results: Most were willing to pay extra for GM foods, an interesting concept as the majority of people in the world are reluctant to do so (Huang *et al,* 2005). The article was helpful in its depiction of how to conduct a geographically broad consumer survey.

Finally, Mainieri *et al* (2007) found that specific consumer beliefs predicted several green-buying variables as well as general environmental attitudes. According to results of a survey mailed to eight L.A. communities, women are more likely to purchase green products than are men. Home ownership was found to be positively related to recycling behavior. The greatest number of respondents reported that they based their purchases on environmental impact primarily when purchasing laundry detergent, followed by household cleansers, paper products, garbage bags, light bulbs, and other products. Mainieri also concluded that respondents with stronger pro-environment beliefs are more likely to buy products because of environmental claims and do consider safety to the environment more strongly when making purchases. Demographics, confusion over environmental marketing claims, and participation in other pro-environment behaviors did not significantly predict green-buying variables. Finally, respondents scored fairly high in their general pro-environment attitudes, lower in their beliefs about environmental responsibility as consumers, and lowest in reported green-buying behaviors. "Conceivable reasons that the respondents' pro-environment consumerism lagged behind their attitudes may include inadequate availability, labeling, and marketing of environmentally beneficial products, as well as higher prices for some of them. These considerations suggest that environmental consumerism can be increased by strengthening pro-environment consumer beliefs, by improving structural factors (availability, labeling, and affordability of environmentally friendly products), or by both," say the authors.

The above studies also helped to highlight the importance of survey design to elicit the most reliable data. Questions must be written in clear, concise language to allow for easy

interpretation. It also seems that online distribution of surveys will require less man-power and thus may increase the number of respondents that can be reached in a given time period.

Consumer Response to Ecolabels

There is a new but vast literature exploring and quantifying the ways in which consumers respond to ecolabels. Numerous studies have utilized both revealed preference and stated preference methods to analyze consumer response to ecolabels associated with and without price premiums. Although no universal consensus on the effectiveness of ecolabels has presented itself, a few trends throughout the literature can be identified.

It is frequently recognized that consumers will positively respond to ecolabels possessing a few highly important attributes. Certification by a recognized and credible third party proves to increase consumer responsiveness to ecolabels, in that they are more likely to buy a product based on a label that is trusted and understood (Anderson and Hansen, 2004; Banerjee and Solomon, 2003; and Mason, 2006). Many suggest that government facilitation of this process may be the most successful way to ensure effectiveness of these labels, in terms of positive consumer response (Bostrom and Klintman, 2006 and Lathrop and Centner, 2004). Despite the positive credibility and standardization that government implementation of standards affords, it is also recognized that the legislative process can be slow and cumbersome and NGOs may offer a more nimble alternative (Lathrop and Centner, 2004; Bostrom and Klintman, 2006). A few articles also highlight the downsides to government facilitation of ecolabels certification. Although they may lend national standardization, credibility, and long-term viability to a labeling program, such pervasive measures may cause distributional inequities; small firms may find it both harder to absorb the costs of certification and may reap fewer of the market benefits (Klooster, 2006). One article suggested that perverse market incentives of certification schemes may favor larger firms to the extent that they might encourage reallocation of land to *less* sustainable practices (Swallow and Sedjo, 2000).

However, as discussed above, greater standardization in labeling may also improve label efficacy, especially in that it can make comparisons across products and labels easier for the consumer and thus more likely to influence their decision-making process (Teisl, *et al,* 2002). Along those lines, it is recognized consumers seem to lend more trust to simpler labels (Banerjee and Solomon, 2003).

It remains unclear whether consumers will respond positively to an ecolabel when it is associated with a price premium. However, it was indicated that this would be more likely to occur if the label possessed the above-mentioned attributes (Anderson and Hansen, 2004). The association of the label with a clear motivation, such as saving the lives of dolphins, was also found to increase a label's effectiveness (Teisl, Roe, and Hicks, 2002). Although this paper insisted that labels can help consumers change a market, few other papers have quantified that

assertion. Labels have been shown to aide in government-filtering of harmful products in international trade (Engel, 2004).

The expanding literature surrounding ecolabels and their influence over consumer choice attests to their growing presence in modern markets. Although further research is needed to elucidate their precise effect, it seems clear that labels possessing a few key attributes are associated with a greater positive response in consumers. Simple labels, certified by a recognizable third party resonate well with consumers, as well as those tied to clear objectives. Greater standardization of ecolabels, allowing for comparison between products and brands, will most likely improve the efficacy of these labels as well.

Despite the considerable literature pertaining to consumer response to existing ecolabels and green products, we found few studies that explicitly asked consumers what criteria they would *prefer* to have represented in an ecolabel. We feel that our research will help fill a gap in the existing literature, and may help inform the design of ecolabels to elicit greater positive response and buy-in from consumers.

There are many different ecolabeling programs and regulations throughout the world. The literature review showed that numerous studies have examined consumer responses to eco-labels, and many employed surveys to gauge consumer perceptions of various aspects of the ecolabels. Simple labels, associated with a recognizable third party, tend to enjoy greater success and consumer trust. However, few studies have attempted to determine the specific environmental criteria consumers value most when making purchasing decisions.

Methodology

Our objective was to ascertain the criteria that green shoppers consider most important in their choice of businesses. Because there is no existing publicly available data on the subject, the best method to obtain this information is to directly ask consumers themselves through the dissemination of an online survey.

To this end, we designed a survey that asked a number of questions about what consumers considered most important when deciding where to shop, their demographic characteristics, and their feelings about the state of the environment in general. The first step was to narrow down the number of business sectors we would ask respondents to consider. Reasoning that a minimum number of sectors would facilitate both the survey process and the data analysis, we ultimately decided on three: food, retail, and service. A significant amount of discussion was held with the client and among the group members on the specific design of the questions, the

criteria that should be considered, etc. The seven environmental criteria chosen were organic certification, toxicity, recycling, energy efficiency, water efficiency, local production, and environmentally friendly packaging. We decided to use the Likert scale for responses, with scores ranging from 1 (not important) to 7 (very important).

In addition to asking respondents to indicate the level of importance attached to criteria when making purchasing decisions, we also included questions assessing the respondent's "green" behaviors via questions about the number of fluorescent bulbs in the household, intent to purchase a high-efficiency vehicle, and frequency of purchasing organic products. We also employed a modified version of Dunlap *et al's* (2000) "New Ecological Paradigm" (NEP) scale to measure respondent's environmental attitudes, and an altruism scale designed by Clark, *et al* (2003), based on the Schwartz (1977) norm-activation model. Both used a five-point Likert response scale, ranging from 1, "strongly disagree" to 5, "strongly agree." The NEP scale asks respondents to complete ten questions (rather than the 15 found in the original version) designed to elucidate the respondent's level of "pro-environmental orientation." The questions refer to three dimensions of environmental beliefs: the balance of nature, limits to growth, and human domination over nature. The altruism scale consists of eight questions (shortened from the nine employed by Clark, *et al* 2003) directed at measuring the influence of altruistic personal norms on respondents' behavior. We adopted the shortened version of both scales for brevity's sake, hoping to avoid survey fatigue. We also assumed that the remaining questions covered the areas of personal beliefs relevant to our study.

Concurrently with this process we submitted an application for approval from the university's human subject protocol committee, as we would be eliciting survey responses from living subjects, albeit anonymously.

Once we felt the questions were clear and comprehensible, and in appropriate order, we each sat down with two to four fellow classmates, who then took the survey and gave us their feedback. Based on their comments, we further refined the questions. We decided that the online survey distribution service, Survey Monkey, would be the most reliable method of disseminating the survey. Once the account was set up and the survey in place, we each tested it on 10 friends or family members, whom we contacted by email, with the survey link included. This process enabled us to familiarize ourselves with Survey Monkey, as well as further refine question wording and layout. We also wrote and included a cover letter to explain the purpose of the survey.

The survey was distributed to several different populations. These populations were: the members of Greenopia, who were contacted via email; first and second-year Bren students; Bren alumni; Bren faculty and staff; additional family members and friends; Craigslist users; readers of the online Huffington Report; and visitors to the Greenopia website. In recognition of the green bias of these populations, we also purchased from Global Market Insite a list of an additional 275 respondents. In sum, a total of 1,984 surveys were disseminated.

Additionally, we offered an incentive to survey takers: a free book from Greenopia's Preferred Reading list. Interested respondents were given the option of submitting their email addresses anonymously through a separate Survey Monkey link, with a name to be selected blindly from each of four subject groups. The surveys were kept open for three weeks, with a reminder email sent midway through that period.

We wished to use measures obtained from the NEP and altruism scales as predictive variables linked to how people would rate the various environmental criteria presented in the survey. However, before we could convert these scales into variables, we needed to test our data for internal consistency. We conducted a principal components factor analysis on both scales, as well as a Cronbach's coefficient alpha.

We then analyzed respondents' decisions to assign importance to the various criteria using a general linear model regression. The model explains the relationship between placing high importance on various criteria, in various sectors, as a function of demographic, behavioral, and attitudinal characteristics.

We administered an online survey aimed at determining consumers' preferences for environmental criteria when choosing among food, service, and retail establishments. A total of 1734 people received the survey, and 760 (43% responded). The survey asked questions about consumers' preferences of seven environmental criteria, their environmentally proactive attitudes and behaviors, their demographic profiles, and their opinions about the environment in general. Responses were compiled and analyzed in order to better define consumer preferences, specifically in the area of environmentally friendly goods and services.

Results

Demographics of Our Respondent Population

Overall, the response rate to our consumer survey was encouraging and gave us a sample population large enough from which to make some interesting observations. As shown in Table 1, the overall response rate was 43%, though this number does not include the 275 paid respondents or estimates for the response rate from our link on the Greenopia webpage. With the exception of our personal email lists, the response rate was approximately the same among respondent categories. Similar response rates to other electronic surveys were found in the literature (Boyer et al, 2001; Shin et al, 2007). As expected, our personal email lists had a higher response rate than did the other groups. It should also be mentioned that there may be some overlap from the grad@bren email list and the allbren@bren email list, indicating that our overall response rate could be slightly higher.

Table 1. Response rate allowing for Greenopia newsletter opening rate

	Greenopia Mailing List	Grad Listserve	AllBren Listserve	Personal Email Lists	Total
Surveys Returned	353	85	122	200	760
Surveys Sent	1042	166	226	300	1734
Response Rate	33%	51%	53%	66%	43%

Our survey sample population differed somewhat from California's general population. Respondents provided information about their gender, age, annual income, number of children, and highest level of education achieved. California census data for 2006 was obtained from the U.S. Census Bureau for comparison among all demographic characteristics, with the exception of number of children; this census data was not available on a per-household basis. The most dramatic difference observed was in gender. While almost exactly half the population of California is female, just over 72% of our survey respondents were female (Figure 1). The higher response rate from women is consistent with the findings of several studies, including one by Wasserman and Richmond (2005) that found a slight increase in the tendency of women to use email for local communication.

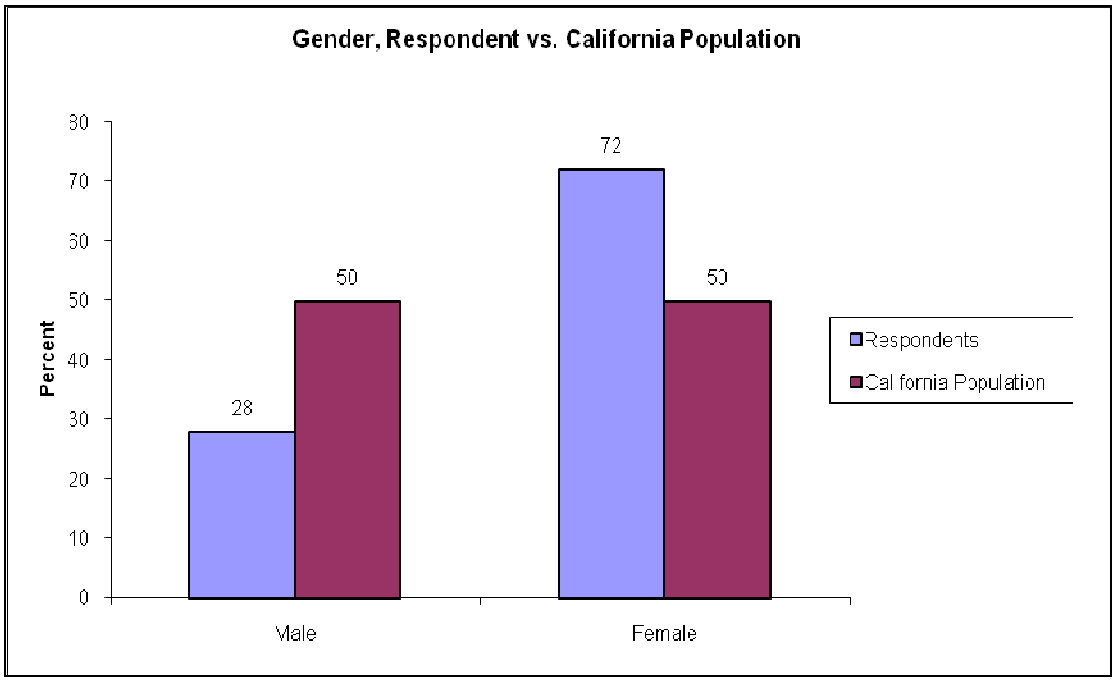


Figure 1. Gender distribution of respondents and California population.

Our respondent population tended to be younger overall than the general California population (Figure 2). The largest discrepancy is observed in the "over 60 years" range; 28% of California's population is aged over 60, compared to only 8.3% of our respondent population. Again, this is not surprising considering that a significant portion of our respondents are affiliated with the Bren program, a population of predominantly younger individuals. Although it is often assumed that environmentalists tend to be younger, Mainieri (2007) found that age, income, and education do not seem to have a significant effect on environmental attitudes. It should be noted that we set a minimum age of response to the survey to be 20 years, and thus adjusted the age range percentages for the population of California accordingly.

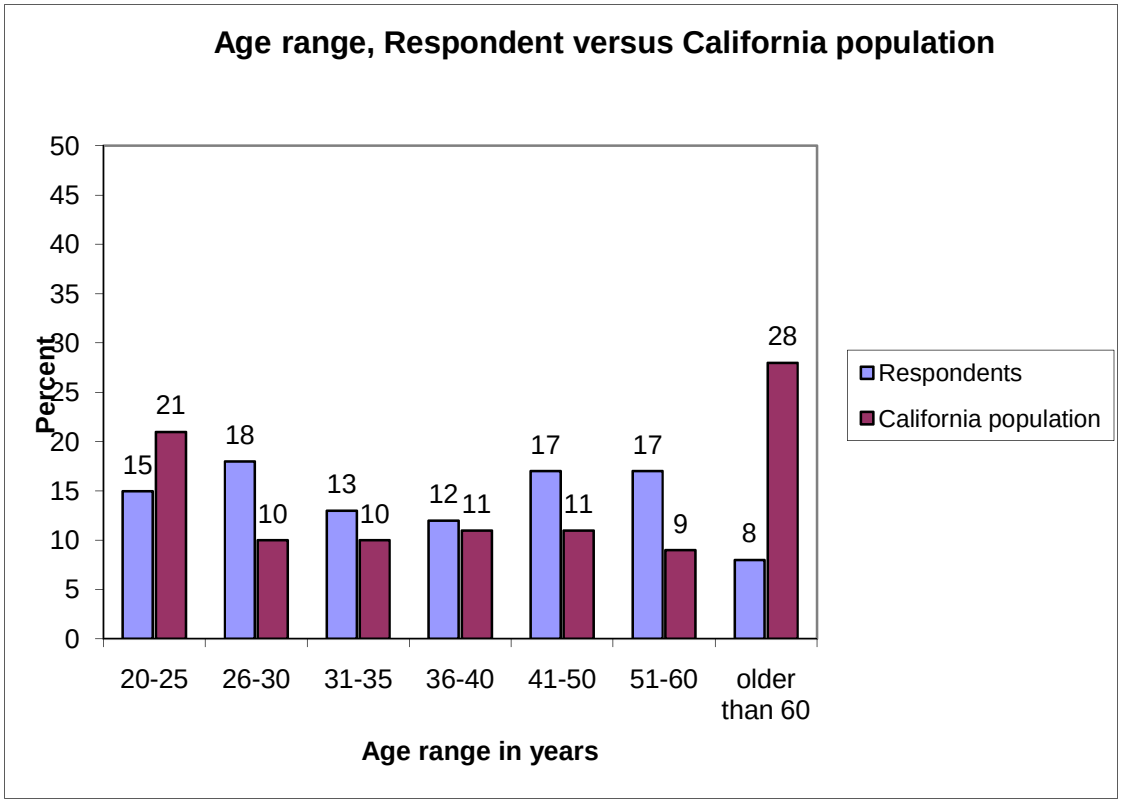


Figure 2. Age distribution of survey respondents and California population.

As with age, the level of education achieved was also fairly different from that of the general California population (Figure 3), with the survey respondents overall having achieved a higher academic level. The percentages of the two populations were the same for the "some college" category, but quite different for the other three categories, especially "grad school/professional". Nearly 36% of our respondent sample has obtained a graduate or professional degree, compared to slightly over 10% of California's population as a whole. We did not find this surprising, again using the same arguments mentioned previously. Wasserman and Richmond (2005) did find that higher education as well as income is linked to increased internet

use. A portion of our sample came from the university; our personal contacts are more likely to have at least finished college; and, a greater proportion of computer-owners tend to be better educated.

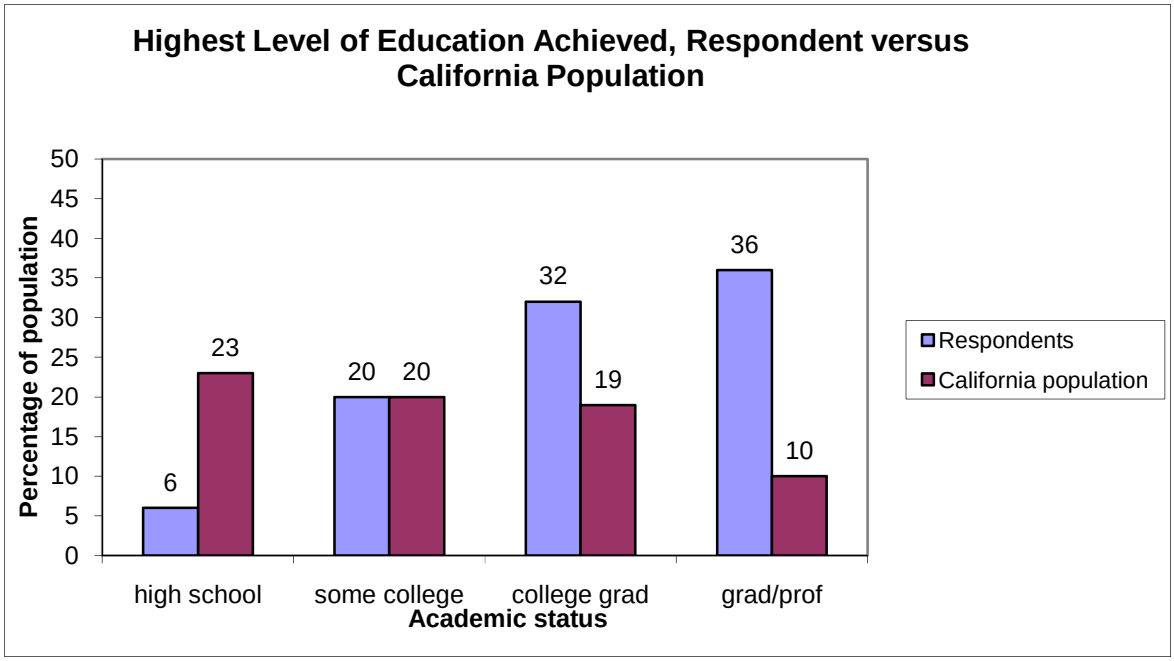


Figure 3. Academic status of survey respondents and California population.

The respondent sample appears to be more similar to the population of California in regards to annual income (Figure 4). The sample population was distributed fairly evenly across the stated income ranges. The largest discrepancy between the two populations can be seen at the lowest income range, with 19% of the sample population earning less than $35,000 annually, compared to 31% of the general California population. Overall, the percentage of our survey respondents in the upper half of the income range provided is greater than that for California.

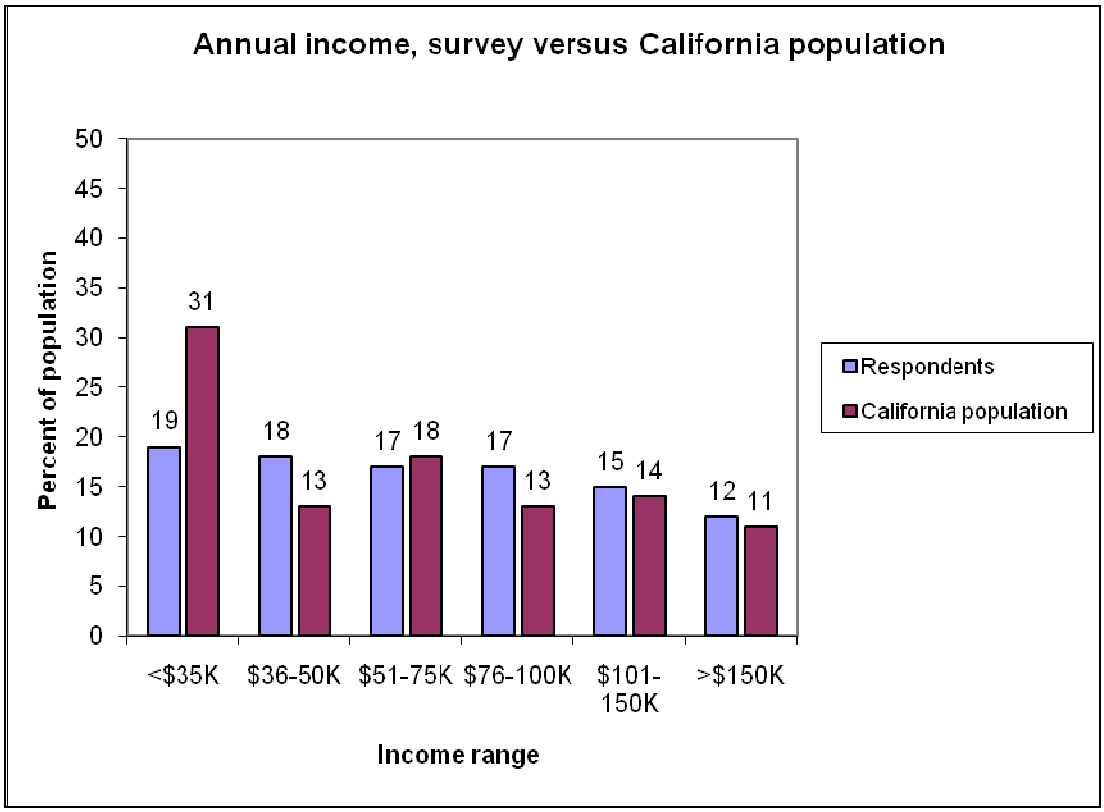


Figure 4. Income distribution of survey respondents and California population.

Overall, our sample population of 760 volunteer and 275 paid respondents appears to be more predominantly female, younger, and better educated than that of the general California population. However, because these demographic characteristics are typically associated with green purchasing, this population is relevant to our study.

Behavioral Characteristics

We found that the majority of our respondents engage in green behaviors. Our survey included a number of questions about eco-friendly behavioral characteristics, specifically in the area of purchasing decisions. Half of our respondent population belongs to an environmental organization of some kind. Considering as a point of comparison that only 0.5% of the state's population belongs to the Sierra Club (2007), that is an impressive figure. Approximately half (49.7%) of the respondents reported that over 60% of the light bulbs in their homes are energy-efficient, with the greatest percentage (25.4) reporting that 76% - 90% of household bulbs are energy-efficient (see Appendices A, G). Only 4.1% of the respondents do not have a single

energy-efficient light bulb in their homes. According to the California-based energy conservation organization, Flex Your Power (FYP), California is the second most energy-efficient state in the nation. The tendency of our survey respondents to purchase energy-efficient light bulbs can be reflected in other behaviors; for example, FYP reports that, "California outpaces the national average in the sale of ENERGY STAR clothes washers, refrigerators, dishwashers and air conditioners" (www.fypower.org, 2008). Furthermore in 2005, the state "saved more than 4 billion kilowatt-hours in 2005 – enough to power more than 660,000 homes."

Just over 60% of the respondents answered that they purchase organic products at least every other time they go to the store (Appendices A, G). Only 5.2% reported that they never purchase organic products. Nearly 56% of the survey respondents indicated that they would be very likely to buy a fuel-efficient car in the future (Appendices A, G). Just over 17% said they would be unlikely to make such a purchase, while nearly 27% indicated they would be somewhat likely to do so. As a point of comparison, in 2006 a total of 67,533 hybrids were sold in California, representing approximately 0.2% of the population (www.hybrids.com website, 2007).

We found that differences in "green" behavior existed between our paid and unpaid respondents. For example, 64% of "volunteer" survey respondents reported that they were very likely to buy an energy-efficient vehicle, compared to only 32% of paid respondents. Similarly, 74% of unpaid respondents indicated they purchase organic products at least every other visit to the store, while 22% of paid respondents indicated that they do so. Nearly 65% of volunteers belong to an NGO, compared to only a little more than 10% of our paid respondents. Interestingly, however, similar percentages – 58% -- of the two sample populations indicated that between 61% - 100% of the light bulbs in their households were energy-efficient.

The survey also attempted to identify the drivers behind consumers' decisions to buy or not buy environmentally friendly products. The reasons provided in the survey for purchasing "green" were: "reduced environmental impact", "improved personal health", "higher quality", "ease of location", and "other". Nearly half of the respondents felt that "reduced environmental impact" was the most important reason to purchase environmentally friendly products (Appendix C). "Improved personal health" and "higher quality" were considered next in importance.

Much more difficult to clarify was why people chose *not* to purchase environmentally friendly products. Reasons provided in the survey were: "environmental impact not being a concern," "higher cost," "lower quality," "insufficient information," "difficult to find," and "other". "Higher cost" was rated as the most important reason not to buy green. Other reasons considered of highest importance were "lower quality" and "not easy to find."

These two questions also provided a category of "other," in which respondents could indicate reasons not provided in the survey. "Other" reasons *to* purchase green products fell primarily into the following categories: packaging – attractive design or recyclability/biodegradability; local or U.S. production; support of a brand, specific company, or "green" companies in general; and, contribution to a greater cause such as fair trade, global warming, and animal rights. Our

survey respondents added that the other motivations *not* to buy green were mainly unfamiliarity with the brand and distrust of the labeling or product claims.

Based on responses to the behavioral characteristics questions, and in comparison to the California population in general, it appears that our respondent sample reports that they engage in an above-average degree of environmentally supportive behaviors. In addition, concern about reducing environmental impact is the primary driver behind their decisions to purchase green products. The high cost of environmentally friendly products is rated as the most important reason for not making the "green" purchase. Additionally, the "unpaid" respondents exhibited a greater tendency than did the "paid" respondents to engage in green behaviors.

Importance Placed on Environmental Criteria

From the first three questions of our survey, we found that respondents find all seven environmental criteria important, and this importance remained relatively uniform across all three business sectors. Summing the importance scores placed on each criterion across the three sectors (Figure 5) reveals that while toxicity was considered slightly more important than the other criteria, organic certification was considered the least important. A criterion could receive a "score" ranging from 3 to 21; according to the boxplot figure, 25% of the survey population gave toxicity a consistently "highly important" score of 21. It was also the only criterion NOT to receive a low score of 3 by any one respondent. In contrast, 25% of the respondents scored "organic certification" between 14 and 18; the median score of 14 was the lowest of all seven criteria. Recycling and environmentally friendly packaging received the next highest median scores, 16.5 and 16, respectively.

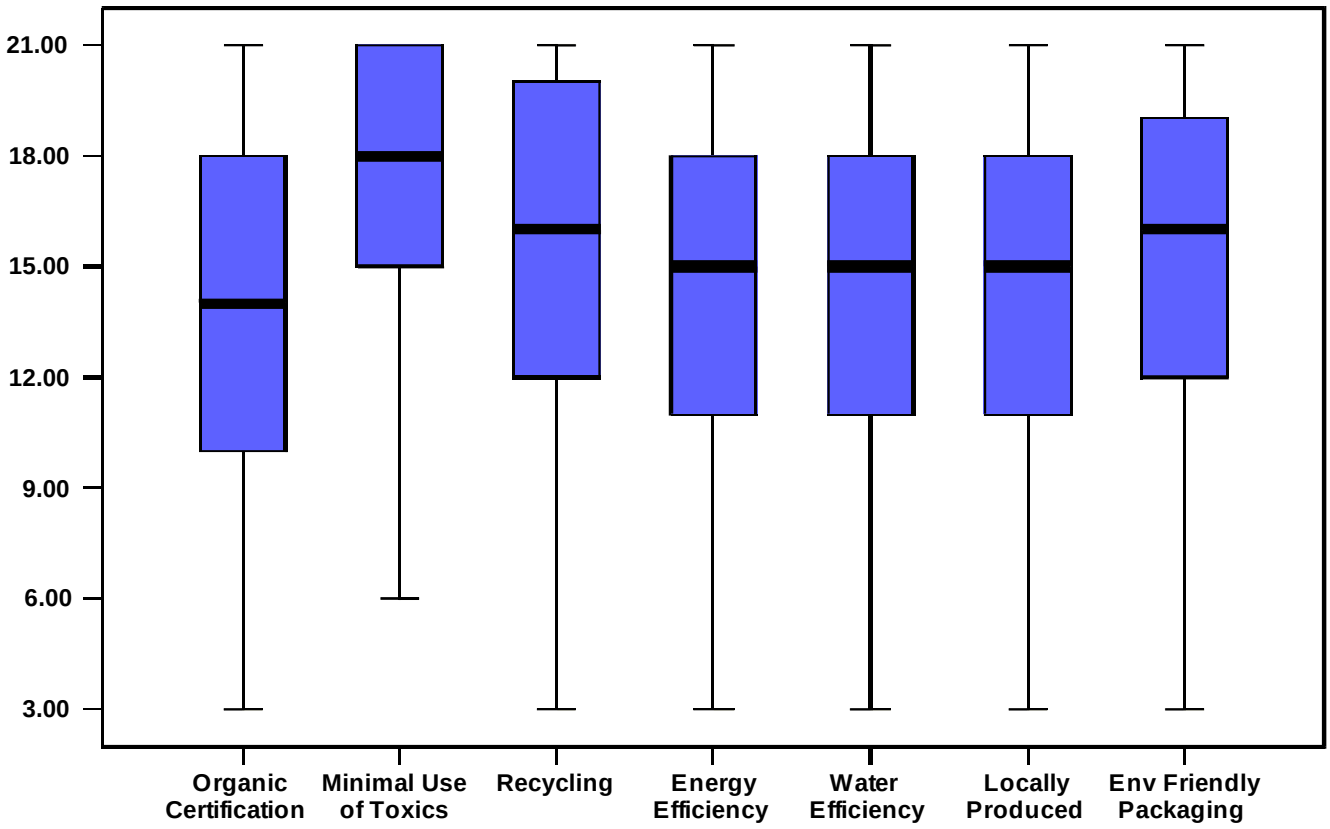


Figure 5. Environmental Criteria Summed Across Three Sectors

Organic certification and local production were considered to be of greater importance when choosing a food establishment than when choosing either a retail or service establishment (Figure 6). Food establishments include farmers markets and grocery stores, so this finding is not surprising. (Additional boxplots by criteria and by sector can be found in Appendix E.)

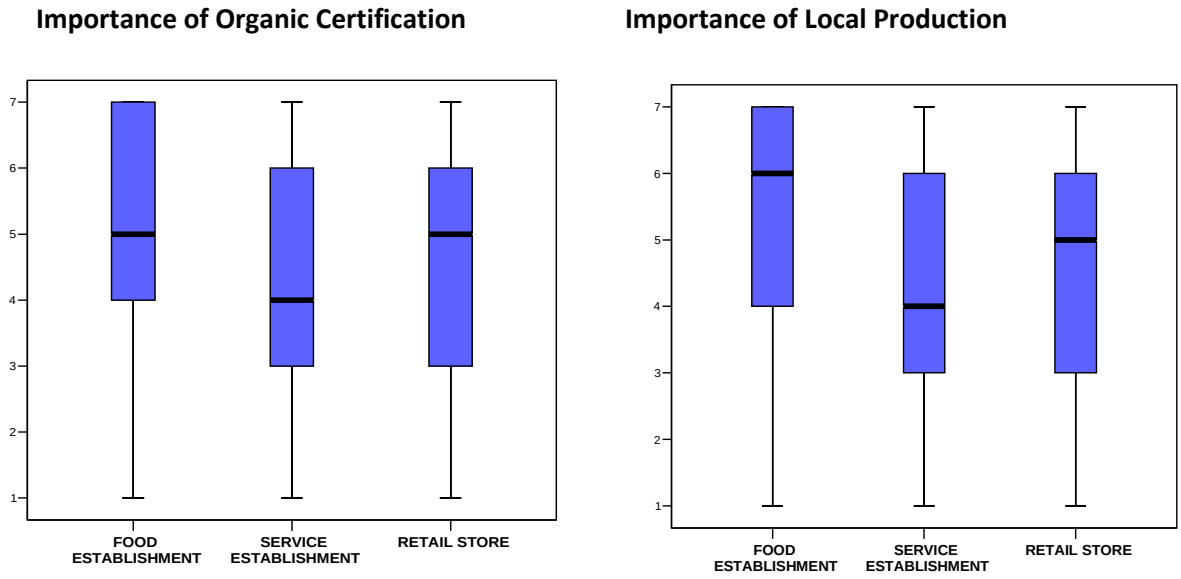


Figure 6. Importance of organic certification and local production

Little variation in degree of importance was observed for the seven environmental criteria – organic certification, toxicity, recycling, energy efficiency, water use efficiency, local production, and environmentally friendly packaging -- across all three business sectors (food, service, and retail). However, respondents did place a slight emphasis on toxicity.

Statistical Analysis of Data

Internal Consistency of Attitudinal Scales

We employed two scales to assess environmental and altruistic outlooks and found our respondents demonstrated high levels of both environmental and altruistic concern. Tables 2 and 3 contain summaries of responses to surveys questions 10 and 11, the New Ecological Paradigm (NEP) scale and the altruism scale, respectively. Response categories include "strongly disagree," "disagree," "unsure," "somewhat agree," and "strongly agree." The NEP scale was designed so that agreement with items 1, 2, 5, 7, and 9 and disagreement with items 3, 4, 6, 8, and 10 indicate a high level of environmental concern. The altruism scale was designed so that agreement with items 2, 4, 5, and 8 and disagreement with items 1, 3, 6, and 7 indicate a high level of altruistic concern. As can be seen from the two tables, the majority of our respondents agreed or strongly agreed with those questions which indicated pro-environment and altruistic perspectives. For instance, note that 55.6% of respondents "strongly agree" with the statement that "Plants and animals have as much right to exist as humans," and 44.6% strongly agree with the statement, "If things continue on their present course, we will soon experience a major ecological catastrophe." Both statements suggest a high level of environmental concern. This is

consistent with past studies that have employed the NEP scale (Dunlap *et al,* 2000; Clark *et al,* 2003; *Kotchen*, 2000; Stern *et al,* 1995).We also see that 86.2% of respondents agree or strongly agree with the statement "Many of society's problems result from selfish behavior," and 88.3% agree or strongly agree with the statement "My personal actions can greatly improve the well-being of people I don't know." This is indicative of a highly green, highly altruistic population.

Table 2. Percentage distributions for NEP scale items. SD is "strongly disagree," SWD is "somewhat disagree," U is "unsure," SWA is "somewhat agree," and SA is "strongly agree.."

Item	SD	SWD	U	SWA	SA
(1) The balance of nature is very delicate and easily upset.	1.9	11.4	8.0	41.6	37.1
(2) Plants and animals have as much right as humans do to exist.	2.8	6.7	5.5	29.5	55.6
(3) Humans will eventually learn enough about how nature works to be able to control it.	34.4	25.4	22.9	12.9	4.3
(4) The so-called "ecological crisis" facing humankind has been greatly exaggerated.	56	19.8	9.7	10	4.5
(5) If things continue on their present course, we will soon experience a major ecological catastrophe.	5.6	7.7	14.4	27.8	44.6
(6) Humans were meant to rule over the rest of nature.	59.3	18.5	8.5	9.2	4.5
(7) The earth is like a spaceship with very limited room and resources.	4.5	11.3	14.2	33.1	36.9
(8) Human ingenuity will insure that we do not make the earth unlivable.	18	28.3	29.4	18.9	5.3
(9) We are approaching the limit of the number of people the earth can support.	5.9	12.6	25.7	26.9	28.8
(10) The balance of nautre is strong enough to cope with the impacts of modern industrial nations.	24	30.1	25.3	15.6	5.1

Table 3. Percentage distributions for the altruism scale items.

Item	SD	SWD	U	SWA	SA
(1) I worry about conserving energy only when it helps to lower my utility bills.	47.9	33.0	3.8	11.9	3.7
(2) Contributions to community organizations can greatly improve the lives of others.	1.4	3.6	11.3	41.5	42.1
(3) The individual alone is responsible for his or her satisfaction in life.	10.4	23.1	12.3	37.5	16.7
(4) It is my duty to help other people when they are unable to help themselves.	2.3	7.1	12.4	48.8	29.3
(5) Many of society's problems result from selfish behavior.	1.7	3.8	8.2	35.5	50.7
(6) Households like mine should not be blamed for environmental problems caused by energy productions and use.	23.7	37.3	21.2	13.3	4.6
(7) My responsibility is to provide*only* for my family and myself.	44.0	37.5	7.0	8.5	3.0
(8) My personal actions can greatly improve the well being of people I don't know.	1.3	2.6	7.3	39.0	49.7

Past studies have demonstrated the appropriateness of using the NEP Scale as a combined and unitary measure of respondents' environmental concern (Dunlap *et al,* 2000; Kotchen, 2000; Clark *et al,* 2003; Stern *et al,* 1995). However, before responses to the ten questions comprising the scale can be combined into a single measure, the data must demonstrate a high degree of internal consistency between each of the items. To test our data for such consistency, we conducted a principle-components factor analysis. All but one of the ten items loaded heavily on the first, un-rotated factor (Question 10.10, "Humans will eventually learn enough about how nature works to be able to control it."). This factor explained 31.9% of the variance among items and had an Eigen value of 3.2 (as compared with the second factor extracted, which explained only 15% of the variance and had an Eigen value of 1.5). Dunlap *et al,* 2000, used a similar pattern of variance-explained and Eigen values to suggest the existence of one major factor among the items in the scale.

We then employed a Varian rotation to further explore the relation of our data to these main factors, and found that all items now loaded relatively well on one of two factors extracted. Loading factors ranged from a low of 0.572 to a high of 0.743. Thus, it was indicative of internal data consistency that the items loading heavily on factor one were 1, 2, 5, 7, and 9 and those on factor two were 3, 4, 6, 8, and 10. Because of this expected pattern, and the fact that the two factors explained 47.3% of data variance, we found it appropriate to turn the scale into a single

variable of respondents' environmental concern (Dunlap *et al*, 2000).The statistics program SPSS can generate a score for each respondent relating his/her answers to the factor, creating a single variable, which we called "NEP variable." We then used this variable in our regression analysis to assess the link between respondents' environmental views and their likelihood of assigning import to the various environmental criteria.

To further test the consistency of the NEP scale, we performed a scale reliability test of the recoded NEP variables (questions 3, 4, 6, 8 and 10 were recoded to assign high values to negative responses). The resulting Cronbachs's coefficient alpha was .75, which would support an acceptable level of reliability and internal consistency to use the NEP data as a combined scale of environmental outlook (Clark *et al,* 2003).

Although the altruism scale is less well-used and empirically tested, we felt that a measure of respondents' altruistic attitudes would be an informative variable in our regression analysis. So, we conducted the same principle-components factor analysis to assess its internal consistency as a single measure of altruistic attitudes. Again, all but one of the items loaded heavily on the first, un-rotated factor ("Many of society's problems result from selfish behavior"). This factor explained 31.1% of the variance among the items and had an Eigenvalue of 2.5 (compared with the second extracted factor, which explained 16.2% of the item variance and had an Eigenvalue of 1.3). When the data was adjusted using a varimax rotation, all items loaded heavily on one of the first two factors extracted. Loading factors ranged from a low of 0.590 to a high of .716. The items that loaded heavily on the first factor were items 2, 4, 5, and 8 and items that loaded on the second factor were items 1, 3, 6, and 7. This was expected, as, again, agreement with items 2, 4, 5, and 8 and disagreement with items 1, 3, 6, and 7 indicate a high level of altruistic concern. The adjusted loading factors explained 47.3% of item variance. In addition to the factor analysis, a scale reliability test was performed to further analyze the internal consistency of the altruism data. The resulting Cronbach's coefficient alpha for the altruism scale was .65. In light of this and the rotated factor analysis, we found it appropriate to treat the altruism scale as a single measure of respondents' altruistic concern (Clark *et al,* 2003; Dunlap *et al*, 2000).We again used SPSS to generate a score for each respondent's relation to the factor, and used this variable as the "altruism variable." We then used this as one of the independent variables in our regression.

Our population demonstrated a high degree of both environmental and altruistic concern, as measured by respondents' answers to the NEP and altruism scale questions. We also found sufficient internal consistency of these responses to condense each scale into a unitary measure of respondents' environmental concern and altruistic attitude. These two measures, "NEP variable" and "altruism variable," were then included as independent variables in our regression analysis.

General Linear Model

The survey data were then used to perform multiple regressions using the univariate general linear model. Many different regression models were analyzed to determine which independent variables best explain the variance of dependent variables such as the importance of environmental criteria.

Table 4 shows the results of the general linear model for the importance of environmental criteria across business sectors. The dependent variable used was the sum of a respondent's valuation of a criterion (e.g. organic certification) in each of the three business sectors (food, service, and retail). Independent variables included all relevant demographic, psychological and behavioral response data.

The general linear model explains from 42% to 25% of the variance of the dependent variable. Many of the independent variables have significant and consistent model parameter coefficients. In general, females value environmental criteria with higher level of importance. Additionally, older respondents are more likely to value criteria with higher importance. Both the NEP and Altruism scales are also significant parameter coefficients in explaining the importance of criteria in the direction that would be expected. The level of education is also a significant parameter; however, it is negative, which corresponds to a higher education level placing lower importance on environmental criteria. Other independent parameter coefficients like family size, level of income, and location are not consistently significant. Self-stated behavioral variables were consistently significant parameter coefficients in the general linear model in the expected direction.

Table 4. General linear model results for different environmental criteria. Parameter estimate significance denoted by asterisk (= significant at 1%, * = significant at 5%).**

	Organic Certification	Toxicity	Recycling	Energy Efficiency	Water Usage	Locally Produced	Environmentally Friendly Packaging
Sex Male	-.914**	-.1.306**	-1.142**	-0.389	-.919**	-.969**	-.867**
Age	.271**	.468**	.399**	.444**	.551**	.336**	.314**
Ecological Paradigm	.978**	.724**	.963**	.993**	.944**	.626**	.983**
Altruism Factor	0.226	.476**	.541**	.490**	.557**	.476**	.642**
Education	-.405**	-.555**	-.505**	-.507**	-.693**	-.353*	-.442**
Children	0.186	0.235	0.017	0.208	0.186	0.159	0.101
Income	-0.124	-0.077	-0.069	-0.096	-0.167	-.249**	-0.067
Outside CA	-0.573	-0.433	-0.516	-0.488	-0.635	-0.377	-.621*
NGO Membership	.738**	-0.102	0.48	0.407	-0.101	.589*	.706**
Use of Efficient Lighting	.141*	.312**	.337**	.423**	.414**	.171**	.316**
Frequency of Organic Purchase	2.223**	.633**	.685**	.486**	.391**	1.381**	.990**
Efficient Car	0.03	.234**	.436**	.381**	.327**	0.142	.251**
Constant	4.648	11.488	8.668	7.357	8.84	7.252	8.329
Number of Observations	929	931	930	930	931	933	930
R-squared	0.424	0.25	0.292	0.252	0.243	0.283	0.326

A similar univariate general linear model was used to model the importance level given to individual business sectors across all environmental criteria. This independent variable was created by summing the importance level of all criteria in one business sector (e.g. food establishment) given by one respondent. The model results can be seen in Table 5.

Table 5. General linear model parameter results for business sector. Significance is denoted with asterisk (= significant at 1%, * = significant at %5).**

	Importance of ALL Criteria when choosing			
	Food Establishment	Service Establishment	Retail Establishment	Importance of all criteria **ACROSS ALL SECTORS**
Sex Male	-2.287**	-2.473**	-1.855**	-7.156**
Age	0.833**	1.019**	.939**	2.792**
Ecological Paradigm	2.007**	2.165**	2.038**	6.151**
Altruism Factor	1.441**	.880**	1.058**	3.282**
Education	-0.805**	-1.180**	-1.471**	-3.366**
Children	0.298	.323	.468	1.126
Income	-0.335	-.203	-.323	-0.882
Outside CA	-1.174	-.975	-1.484*	-3.783*
NGO Membership	0.627	.857	1.261	2.919
Use of Efficient Lighting	0.545**	.809**	.754**	2.038**
Frequency of Organic Purchase	2.655**	2.034**	2.061**	6.616**
Efficient Car	0.578**	.529**	.711**	1.88**
Constant	18.954	18.913	18.844	56.917
Number of Observations	929	928	926	913
R-squared	0.375	.307	.306	0.351

The general linear model explains from 37% to 30% of the variance of the dependent variable: business sector. The trends and consistency of parameter coefficients and their significance are the same as described in Table 4. Respondents who are female, higher in age, score higher on the NEP and ALT scale, have lower levels of education, and claim green behavioral practices tend to rate environmental criteria of a business more importantly.

A GLM model was also used to explain the variance of the dependent variable of the importance of environmental criteria across all business sectors. To obtain this dependent variable, the importance value given by each respondent to every criterion in every business sector was summed. The GLM explains approximately 35 percent of the variation in the dependent variable. The model trends that have been described above are consistent when importance is examined at the broadest level: all criteria across all sectors.

In order to better understand the unexpected results for the education level and age parameter coefficients, further regression analysis was completed. Similar GLM regressions, with the same independent and dependent variables, were run; however, the education and age variables were analyzed as fixed factors as opposed to continuous covariates. This type of regression should indicate whether a single education level or age group disproportionally skewed model results.

Regressions using the univariate general linear model found that being female, belonging to an older age bracket, and scoring high on the NEP and altruism scales are correlated with a tendency to rank environmental criteria as more important.

Discussion

Our primary conclusion is that consumers in our survey valued all seven environmental criteria, and fairly evenly across all three business sectors. Respondents did place a slight emphasis on toxicity, while regarding organic certification to be the least important of the criteria measured. The state of California appears to share this concern over toxicity. Officials with the state Department of Toxic Substances Control recently put together a slate of proposals aiming to replace many of the chemicals used in industries such as prescription drugs, plastic food packaging, pesticides, cosmetics and household cleaners with nontoxic substitutes. Among the recommendations are policies that would "involve creating a new regulatory and enforcement system, strengthening consumer protection laws and better informing consumers about toxic substances in products." On the other hand, the difference in degree of importance attached to the "organic certification" and "toxicity" criteria may be more a function of consumers' insufficient understanding of exactly what "organic certification" means. Under the auspices of the USDA's organic labeling program, "the Organic Foods Production Act and the National Organic Program (NOP) are intended to assure consumers that the organic foods they purchase

are produced, processed, and certified to (be in accordance with) consistent national organic standards" (USDA website, 2007). This means that they contain only organically produced ingredients (with the exception of water and salt) – i.e., *no toxic chemicals*, including pesticides, herbicides, fertilizers and food additives. A more complete consumer understanding of exactly what qualifies a product to be organically certified might lead to more consistency in rating the importance of the two criteria. Similar "linking" of other criteria was observed; for example, respondents tended to value equally energy and water efficiency, as well as recycling and environmentally friendly packaging.

The most striking demographic result of our survey data was the overwhelming bias toward females in both our paid and unpaid respondent survey samples. The generally held perception that women tend to do most of the shopping for the household may contribute to the explanation for this anomaly. Additionally, Mainieri *et al* (2007) found in their study of influences on green consumer behavior, that women tend to be more environmentally friendly than are men. Thus they might be more interested in answering a survey of this nature. Further, this attitude tends to be reflected in their purchasing behaviors.

Our survey sample also indicated a strong tendency to engage in other behaviors considered environmentally friendly, such as purchasing an energy-efficient vehicle, using energy-efficient light bulbs, and buying organic products at least every other trip to the store. Half of our respondents claimed to also belong to an NGO. These pro-environmental practices could possibly explain the balanced consideration given to all the environmental criteria; perhaps people who engage in daily green behaviors would expect the same degree of attention to be paid to environmental impacts by the providers of the goods and services they purchase.

An attempt to discover exactly why people choose to buy or not buy environmentally friendly products was not as successful as we would have liked, but some interesting information did emerge. Half of the respondents indicated that "reduced environmental impact" was a very important (highest score of 7) reason to purchase an environmentally friendly product. This would align with the tendency of our sample population to score highly on the NEP and altruism scales, reflecting both a high degree of environmental concern and altruistic attitude. On a more personal level, respondents also considered "higher quality" and "improved personal health" to be important reasons to choose the environmentally friendly product. Additional reasons that respondents gave fell primarily into four categories: attractive or recyclable/biodegradable packaging, local or U.S. production, support of a brand or of a company in general, and consideration for "greater" causes such as animal welfare or global warming.

As far as to what drove consumers *not* to purchase an environmentally friendly product, "higher cost" was the most important reason cited, followed by "lower quality" and "hard to find." Independently provided reasons (given in the "other" column) were primarily unfamiliarity with the brand and distrust of its claims. Though much more extensive research on this question of purchasing motivations is warranted, green businesses would certainly benefit immediately from the knowledge that their products could be both of higher quality and less expensive;

granted, this is a difficult combination to achieve. On a larger scale, businesses and customers alike would benefit from rigorous and well publicized labeling schemes.

Our statistical analysis shows that women generally place a higher importance on the environmental performance of a business establishment than do men. Additionally, our model predicts that consumers who are older in age assign a higher importance value to environmental criteria of business establishments than do younger age groups. As should be expected, our model predicts that consumers who exhibit high environmental and altruistic attitudes tend to place higher importance on environmental criteria of business establishments. By in large, our model does not predict any significant differences in the importance assigned between different environmental criteria by different demographic groups.

In conclusion, we find that consumers valued all seven of the criteria we surveyed them about, and did so consistently across the three business sectors we considered. Our analysis showed that women, older respondents, and those respondents scoring higher on both the NEP and altruism scales were more likely to place a high value of importance on all of the criteria. We found little variation in the level of importance assigned to the various criteria, although toxicity was consistently valued as the important and organic certification was consistently the least important, although these differences were slight. We also found that respondents who reported a high degree of green behavior were also likely to value the environmental criteria as important in helping them choose a business establishment.

The survey population considered all seven environmental criteria to be of relatively equal and high importance across all three business sectors; the use of toxic chemicals was assigned the highest importance value and organic certification was assigned the lowest importance value. Because these differences were slight, weighting of the seven criteria should be uniform to reflect consumer preference.

Recommendations/Conclusions

Our findings indicate that consumers are concerned with a wide variety of environmental criteria. We therefore recommend that organizations aiming to assess the environmental practices of businesses and convey this information to consumers should include a variety of environmental criteria in their evaluative scheme. The use of a single environmental criterion may not adequately capture the information consumers are interested in obtaining about a business's practices. Because consumers demonstrated a fairly uniform preference for all of the seven environmental criteria included in our survey, we also recommend that these criteria be assigned equal weighting in any such evaluative scheme, if such a scheme is designed to reflect consumer preference alone. These weights should remain constant across all three business sectors, again, to reflect the consistency of consumer preference. Survey respondents did assign

a slightly higher level of importance to toxicity in all three business sectors, so this could be given a slightly higher weight than the other criteria.

However, it is appropriate to ask whether consumer preference should be the only factor informing the weighting of the various criteria. Because we found that consumers assigned differing importance to two related criteria (organic certification and toxicity), with similar environmental implications, consumers may not be appropriately informed regarding the various criteria and their respective implications. It may be cogent to consider the environmental impact of the various criteria, and reflect this in the weighting scheme. As discussed above, Life Cycle Analysis offers a comprehensive assessment of a product's overall environmental impact, from extraction to disposal. Aspects of this assessment technique could be integrated into an evaluative scheme to quantify each criterion's relative impact in a specific locality. Educational or explanatory materials aimed at informing consumers of the impact and meaning of the criteria may also serve to increase the legitimacy of using consumer preference to inform an evaluative scheme, as well as increase the effectiveness of labeling programs based on these criteria.

Future Research Questions

Our results and analysis have produced very interesting conclusions and well-founded recommendations regarding the application of environmental criteria. However, our research has also identified further data gaps and research questions in the specific fields of environmental criteria and eco-labeling.

For example, we suggest that future research be conducted to examine whether a single environmental criterion (e.g. organic certification) can serve as an effective proxy for overall environmental performance. That is, if a service provider scores highly on a single environmental criterion, on average, will they score highly on other relevant criteria? This type of criteria correlation would be expected between use of organically certified products and minimal use of toxic substances, but it is not certain if there are other correlations between less related environmental criteria. Use of a proxy criterion could also minimize time and effort needed to calculate a business's "score," and might increase reporting.

Although consumers assigned importance to all seven criteria, organizations must be careful when designing an ecolabel not to include too much information for a consumer to easily interpret and digest. The comparison between EPA's successful Energy Star program, which presents only one criterion, energy efficiency, and the European Blue Flower label, which presents a complicated multi-criteria analysis and has enjoyed considerably less success, highlights this tension (Sammer K and R Wustenhagen, 2006; Wagner, 1997). It should be tested whether the inclusion of all seven of the environmental criteria tested in our study presents too much information for consumers to readily absorb.

Another important research question is how different environmental criteria should be weighted when evaluating the overall performance of a service provider. Our research suggests that all criteria should be weighted relatively evenly based on consumer preferences and what they think is most important. It should be noted, however, that if overall environmental impact is the overarching focus, then a different weighting scheme may be warranted. For example, the minimal use of toxic chemicals may be important to consumers, but it is not a good proxy for the impact on climate change. Associated with a different rating scheme, based on a different overarching criterion, is consumer response and acceptance. Altering the weighting scheme away from a single criterion to a multi-criteria regime may be necessary to educate consumers about the differences among these criteria.

Suggested Improvements to Our Project

Although our project achieved a high degree of logistical success and an impressive survey response rate, we did encounter a few obstacles throughout the process. The questions in the survey designed to highlight consumer motivations when deciding to buy or not buy environmentally friendly products proved difficult for respondents to understand. Question #8, reasons TO buy, should have included more options, such as supporting a specific company or contributing to a "greater good." The next question about why the respondent may decide NOT to purchase green products was simply confusing. This is an important question that merits further and more extensive research, and more informative data could have proven beneficial to the client.

A wider distribution of the survey, perhaps to populations outside of California, may have made our data more varied and analytically interesting. A broader audience with less potentially environmental biased leanings could have been helpful; on the other hand, this guide is designed for those consumers who truly care about the environment, so in that regard the target audience was the one we surveyed.

Given more time, we could have helped design the questionnaires and criteria weighting applied to the businesses being surveyed for inclusion in the guide.

References Cited

Anderson and Hansen (2004). “Determining consumer preferences for ecolabeled forest products: an experimental approach.” *Journal of Forestry*, 102 (4):28-32.

Anderson and Hansen (2004). “The impact of environmental certification on preferences for wood furniture: A conjoint analysis approach.” *Forest Products Journal*, 54(3): 42-50.

Banerjee and Solomon (2003), “Eco-labeling for energy efficiency and sustainability: a meta-evaluation of US programs.” *Energy Policy*, 31(2): 109-123.

Bostrom and Klintman (2006). “State-centered versus nonstate-driven organic food standardization: A comparison of the US and Sweden.” *Agriculture and Human Values*, 23(2): 163-180.

Boyer K., Olson, J., and Jackson, E. (2001), “Electronic surveys, advantages and disadvantages over traditional print surveys.” *Decision Point,* from http://www.decisionsciences.org/decisionline/Vol32/32_4/32_4res.pdf

Bruce and Laroiya (2006). "The Production of Ecolabels." *Alberta Energy Utility Board*, 6 October.

Clark, C.F., Kotchen, M.J., Moore, M.R. (2003). “Internal and external influences on pro-environmental behaviour: Participation in a green electricity program.” *Journal of Environmental Psychology*, 23: 237-246.

Cone, Marla (2008). “State to launch effort to develop ‘green’ substitutes for chemicals.” *Los Angeles Times*, Jan. 31 , p. B3.

Downs, T.C. (1992). “Environmentally friendly product advertising: Its future requires a new regulatory authority.” *The American University Law Review* 42: 155-198.

Dunlap, R. E., Van Liere, K.D., Mertig, A.D., & Jones, R.E. (2000) “Measuring Endorsement of the New Ecological Paradigm: A Revised NEP Scale.” *Journal of Social Issues,* 56 (3): 425-442.

Engel, Stephanie (2004). “Achieving environmental goals in a world of trade and hidden action: the role of trade policies in eco-labelling.” *Journal of Environmental Economics and Management*, 48(3): 1122-1145.

European Parliament (2003). Restriction of Hazardous Substance Use (ROHS Directive).

Federal Trade Commission. http://www.FTC.gov. Accessed on 4/22/07.

http://corporate.basf.com/en/sustainability/oekoeffizienz/label.htm?id=V00-8DgFPAIgKbcp.4p.

http://erae.oxfordjournals.org/cgi/reprint/33/2/249

http://lef.nancy-engref.inra.fr/Docs/p5.pdf

http://web.ebscohost.com/ehost/pdf?vid=2&hid=108&sid=99ebe92d-2d04-49d6-9afd-b869c9dcb7e6%40sessionmgr106

http://www.carbon-label.co.uk/

http://www.defra.gov.uk/environment/consumerprod/glc/index.htm

http://www.ecocert.com/.

http://www.environmentalchoice.com/English/ECP%20Home/

http://www.eurep.org.

http:// www.fypower.org/about/faq.hetml#cfls

http://www.global-standard.org/

http://www.hybridcars.com/market-dashboard/feb07

http://www.pnrec.org/pnrec97/hays2.htm

http://www.rainforest-alliance.org/programs/forestry/smartwood/faq.html.

http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6WB2-4J8M3CS-2&_user=112642&_coverDate=03%2F31%2F2006&_rdoc=1&_fmt=&_orig=search&_sort=d&view=c&_acct=C000059608&_version=1&_urlVersion=0&_userid=112642&md5=f8b05cd32f04eb00443fca0f761117f8

http://www.thegoodshoppingguide.co.uk/the-ethical-company-accreditation-scheme.htm.

http://www.ams.usda.gov/nop/FactSheets/LabelingE.html

Huang J, Qiu H, Bai J, and C Pray (2005). “Awareness, acceptance of, and willingness to buy genetically modified foods in urban China.” *Appetite* (46)2; 144-151.

International Standardization Organization (ISO) 14000 (2006). Environmental management – Life cycle assessment – Requirements and guidelines.

Israel, G. (1992). “Taming the green marketing monster: National standards for environmental marketing claims.” *Boston College Environmental Affairs Law Review* 20: 303-333.

Klooster, Dan (2005). “Environmental certification of forests: The evolution of environmental governance in a commodity network.” *Journal of Rural Studies*, 21: 403-417.

Klooster, Dan (2006). "Environmental Certification of Forests: The Political Ecology of a Nongovernmental market Intervention." *Annals of the Association of American Geographers*, 96(3): 541.

Kotchen, M.J. & Reiling, S.D. (2000). "Environmental attitudes, motivations, and contingent valuation of nonuse values: A case study involving endangered species." *Ecological Economics,* 32: 93-107.

Kotchen, Matthew (2005). "Impure public goods and the comparative statics of environmentally friendly consumption." *Journal of Environmental Economics and Management* 49: 281-300.

Lanthrop, Kyle (1998). "Eco-Labeling and ISO 14000: An Analysis of US Regulatory Systems and Issues Concerning Adoption of Type II Standards." *Environmental Management* 22: 163-172.

Lathrop and Centner (2004). "Eco-Labeling and ISO 14000: An Analysis of US Regulatory Systems and Issues Concerning Adoption of Type II Standards." *Environmental Management*, 22(2): 163-172.

Loureiro M, Azucena G, and R Nayga (2006). "Do consumers value nutritional labels?" *European Review of Agricultural Economics* 33(2); 249-268.

Mainieri T, E Barnett, T Valdero, J Unipan, and S Oskamp (2007). "Green buying: the influence of environmental concern on consumer behaviour." *The Journal of Social Psychology*, 137.n2:189(16).

Mason C. (2006). "An economic model of ecolabeling." *Environmental Modelling and Assessment*, 11:131-143.

Moon *et al* (2002). "Willingness to Pay for Environmental Practices: Implications for Eco-Labeling." *Land Economics*, 78(1): 88-102.

Murphy, C. (2003). "The Next Big Thing." *Fortune Small Business.* 13: 64.

Nimon W. and J. Beghin (1999). "Are Eco-Labels Valuable? Evidence from the Apparel Industry." *American Journal of Agricultural Economics* 81:4:801-811.

Noblet CL, Teisl M and J Rubin (2006). "Factors affecting consumer assessment of eco-labelled vehicles." *Transportation Research part D: Transport and Environment* 11(6); 422-432.

Nunes P. and Riyanto Y. (2005). "Information as a regulatory instrument to price biodiversity benefits: certification and ecolabeling policy practices." *Biodiversity and Conservation*, 14:2009-2027.

Organic Trade Association, (2006). The OTA 2006 Manufacturer Survey Overview available at http://www.ota.com/organic/mt.html

Ottman, J. A. (1998). "Innovative marketers five new products the green light." *Marketing News.* 32: 10.

Pederson (2005)."Caveat Emptor – Let the Buyer Beware! Environmental Labelings and the Limitations of Green Consumerism." *Business Strategy and the Environment* 15:(15-29)

Peattie, K. (1992). *Green Marketing*. Pittman: London

Raines, J. (1992) "Environmental law: The green giant: Environmental marketing claims. " *Oklahoma Law Review* 45: 689-716.

Sammer K and R Wustenhagen (2006). "The influence of eco-labelling on consumer behaviour – the results of a discrete choice analysis of washing machines." *Business Strategy and the Environment* 15(3); 185-199.

Schwartz, S.H. (1977) "Normative Influences on Altruism." In L. Berkowitz (Ed.), *Advances in experimental social psychology,* Vol. 10 (pp. 221-279). New York: Academic Press.

Shinn G, M Baker and G Briers (2007). "Response patterns: effect of day of receipt of an e-mailed survey instrument on response rate, response time, and response quality." J*ournal of Extension* 45(2) from http://www.joe.org/joe/2007april/rb4.shtml

Stern, P.C., Dietz, T., & Guagnano, G.A. (1995). The new ecological paradigm in social psychological context. *Environment and Behavior,* 27(6): 723-743.

Swallow and Sedjo (2000). "Eco-Labeling Consequences in General Equilibrium: A Graphical Assessment." Land Economics, 76(1): 28-36.

Teisl, et al (2002). "Consumer Reactions to Environmental Labels for Forest Products: a Preliminary Look." Forest Products Journal, 52(1): 44-50.

Teisl, Roe, and Hicks (2002). "Can Eco-Labels Tune a Market? Evidence from Dolphin-Safe Labeling." Journal of Environmental Economics and Management, 43: 339-359.

U.S. Census Bureau, (2006). http://factfinder.census.gov/home/saff/main.html

U.S. Organic Industry Overview. The Organic Trade Association. Accessed 12/4/2007.

http://www.ota.com

Wagner SA. (1997) *Understanding Consumer Green Behavior – a Qualitative Cognitive Approach*. Routledge: London

Wasserman, Ira M + Richmond Abbot, M. (2001) "Gender and the Internet: Causes of Variation in Access, Level, and Scope of Use." Social Science Quarterly, vol. 86:1, pp 252-270.

European Parliament (2003).Waste Electrical and Electronic Equipment (WEEE Directive).

Appendix A. Response Percentage Charts

These charts indicate the percentage of survey respondents who chose each option provided in the questions pertaining to environmentally conscious behaviors. The options provided in the question are in the left column of the chart. The actual number of respondents are indicated in the "frequency" column, and the percentage of the total sample population in the "percent" column.

What percentage of the light bulbs in your home are energy efficient?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0 %	46	4.1	4.1	4.1
	< 15%	130	11.6	11.6	15.7
	16-30%	137	12.2	12.3	28.0
	31-45%	106	9.4	9.5	37.5
	46-60%	143	12.7	12.8	50.3
	61-75%	151	13.4	13.5	63.8
	76-90%	286	25.4	25.6	89.4
	100%	119	10.6	10.6	100.0
	Total	1118	99.5	100.0	

How often do you purchase organic products?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	never	59	5.2	5.3	5.3
	sometimes (1 out of every 10 trips to the grocery store)	193	17.2	17.2	22.5
	occasionally (1 out of every 5 trips to the grocery store)	195	17.3	17.4	39.9
	often (every other trip to the grocery store)	334	29.7	29.8	69.8
	always (every trip to the grocery store)	338	30.1	30.2	100.0
	Total	1119	99.6	100.0	

For your next automobile purchase, how likely are you to buy a fuel-efficient car or vehicle (averages at least 35 mpg or more)?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	very unlikely	42	3.7	3.8	3.8
	2	29	2.6	2.6	6.4
	3	35	3.1	3.1	9.5
	4	89	7.9	8.0	17.4
	5	128	11.4	11.4	28.9
	6	170	15.1	15.2	44.1
	very likely	625	55.6	55.9	100.0
	Total	1118	99.5	100.0	

Appendix B. Response Percentage Tables, Criteria

The three charts below indicate the percentage of our sample who responded to each question asking the degree of importance attached to the seven criteria. The importance, ranging from 1 (not important) to 7 (very important), appears in the first column. The seven criteria are listed across the top. The importance number with the highest percentage of respondents is highlighted for each of the criteria.

Q.1 When choosing a FOOD establishment, how important are the following environmentally friendly criteria?

Importance	Organic	Toxicity	Recycling	Energy	Water	Local Prod	Packaging
1	7.5	2.4	5.4	8.0	7.5	4.6	4.7
2	7.4	4.1	4.5	9.9	8.2	4.4	5.1
3	9.7	3.9	7.3	9.9	9.5	7.3	7.7
4	13.9	10.5	13.1	17.9	17.9	15.6	14.9
5	17.0	13.3	17.2	17.8	17.9	16.8	18.9
6	17.4	18.9	21.7	17.9	17.4	22.5	22.1
7	**27.1**	**46.8**	**30.7**	**18.6**	**21.5**	**28.7**	**26.5**

Q.2 When choosing a SERVICE establishment, how important are the following environmentally friendly criteria?

Importance	Organic	Toxicity	Recycling	Energy	Water	Local Prod	Packaging
1	10.0	2.8	5.5	5.6	5.5	10.3	5.6
2	10.3	3.4	4.3	6.3	7.5	9.4	7.0
3	11.5	5.5	7.7	8.8	8.3	10.6	9.4
4	**19.4**	9.3	15.2	17.3	15.9	**20.7**	16.5
5	16.9	11.3	15.8	17.9	16.8	17.4	16.6
6	13.5	21.1	22.5	**22.2**	21.8	14.9	21.3
7	18.6	**46.6**	**29.0**	21.9	**24.2**	16.7	**23.7**

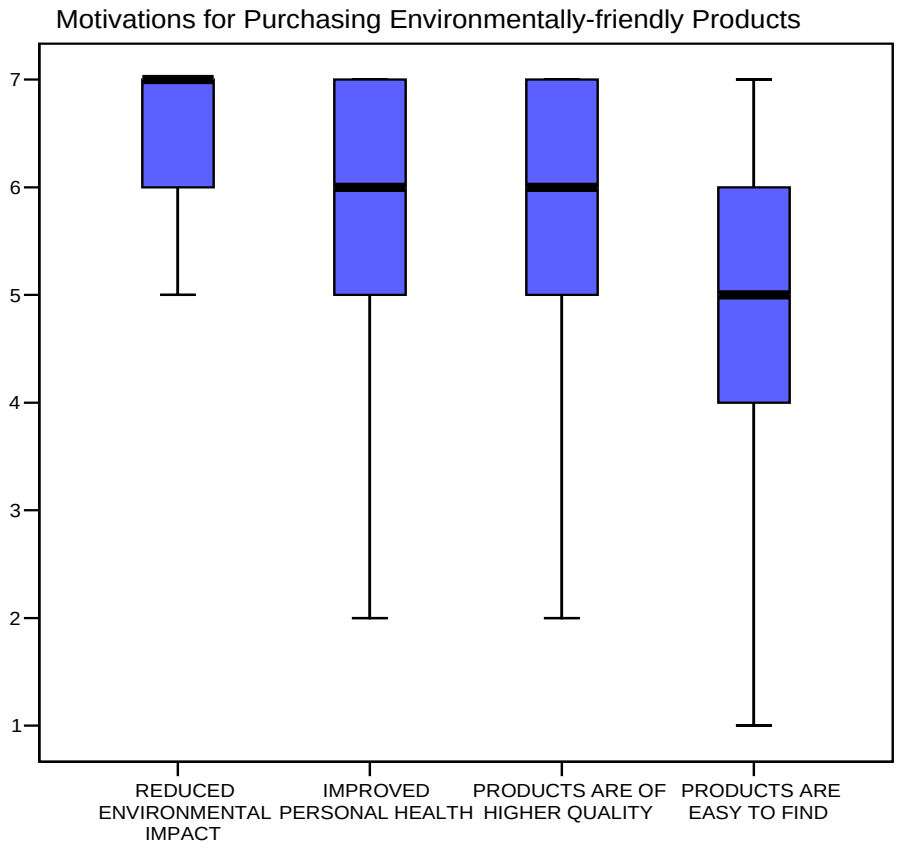
Q.3 When choosing a RETAIL establishment, how important are the following environmentally friendly criteria?

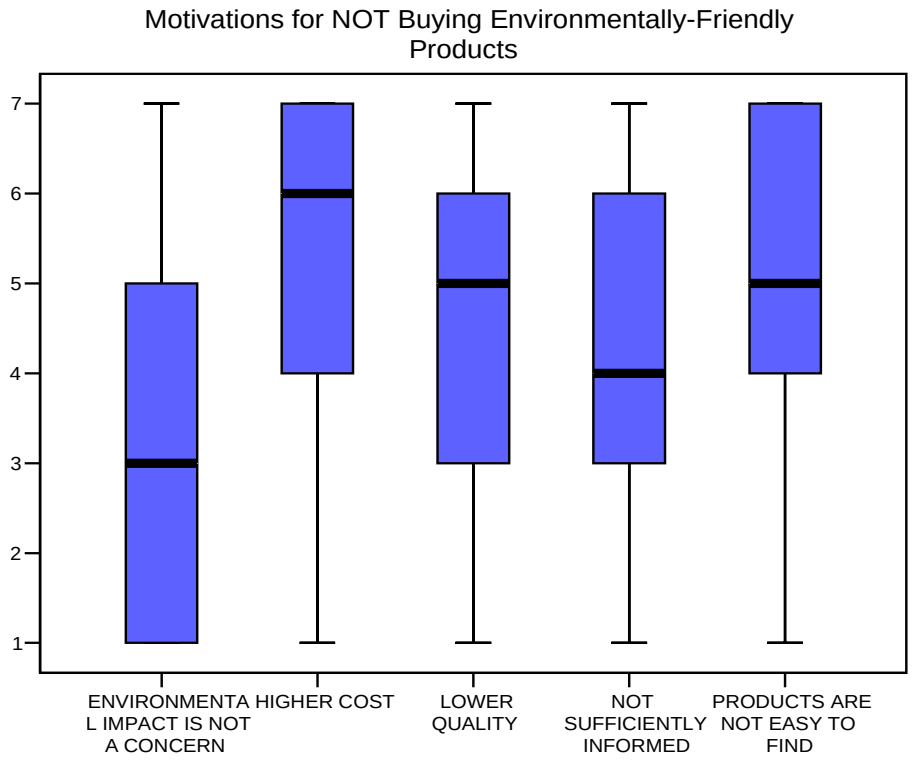
Importance	Organic	Toxicity	Recycling	Energy	Water	Local Prod	Packaging
1	9.8	3.9	6.0	7.0	8.6	9.8	5.3
2	8.7	4.4	5.1	7.0	9.3	8.4	4.3
3	11.1	6.6	7.0	9.7	10.3	11.1	6.9
4	17.4	10.0	13.6	17.7	17.1	17.9	14.2
5	17.6	15.1	18.7	**20.5**	18.9	**18.1**	18.7
6	14.8	18.3	21.2	19.1	16.8	16.8	22.2
7	**20.6**	**41.8**	**28.5**	19.0	**19.0**	17.9	**28.4**

1=not important, 7=very important

Appendix C. Response Percentage Box Plots, Attitudes

The box plots below indicate the level of importance that respondents attached to various reasons both to buy and not to buy environmentally friendly products. The dark line across each box indicates the median value. The area of the box above the median represents the third quartile, and the area below the line the first quartile, of responses.

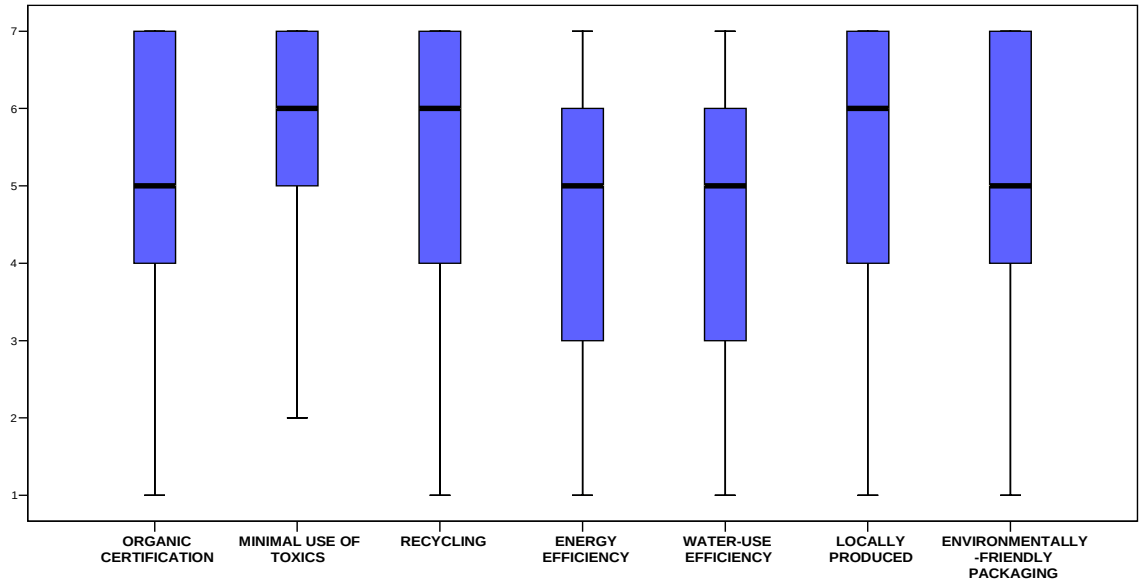



Motivations for NOT Buying Environmentally-Friendly Products
7
6
5
4
3
2
1
ENVIRONMENTAL IMPACT IS NOT A CONCERN
HIGHER COST
LOWER QUALITY
NOT SUFFICIENTLY INFORMED
PRODUCTS ARE NOT EASY TO FIND

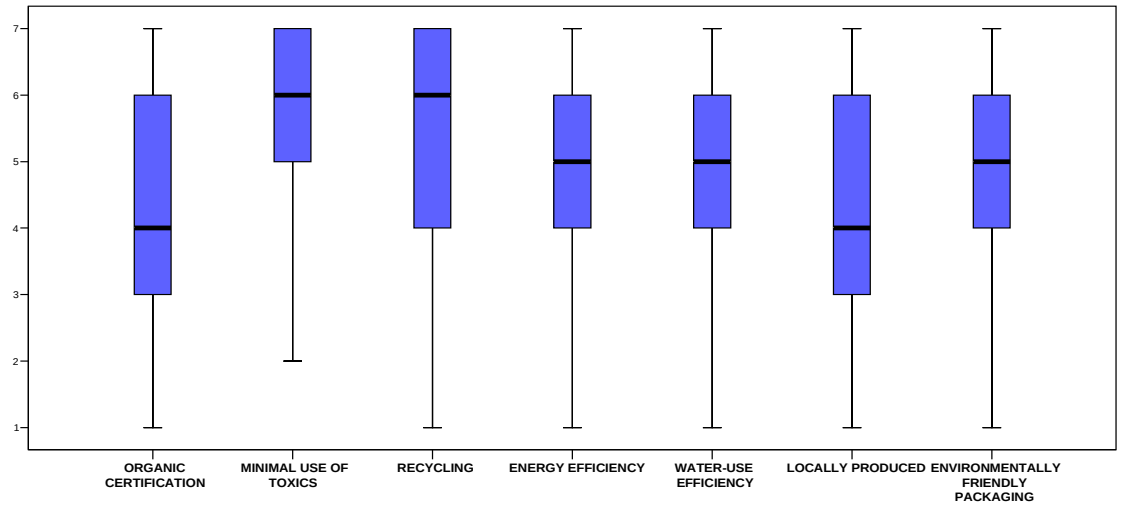
Appendix E. Importance of Criteria for Each Sector

Box plots were created based on the mean response to questions about the value placed on the seven environmental criteria when choosing a food, service, or retail establishment. The charts below show the results for all three sectors.

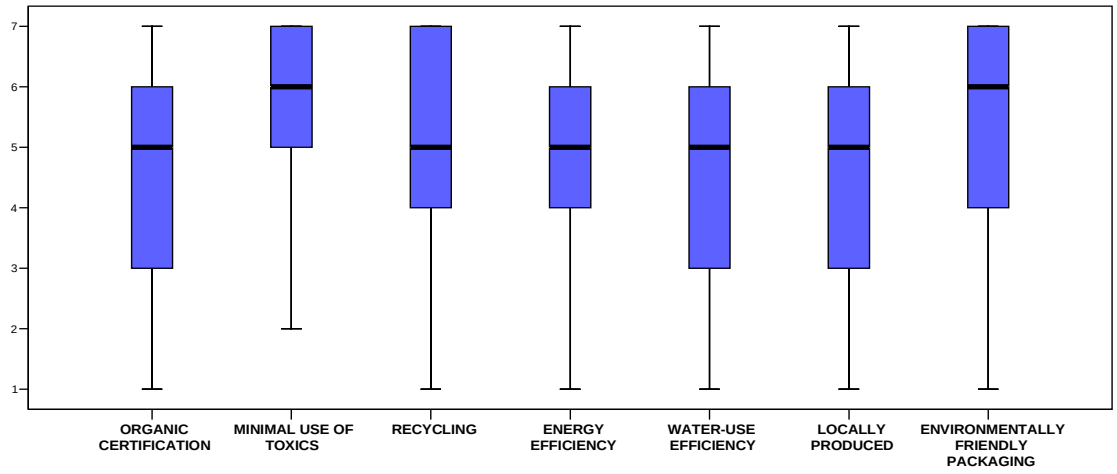
Importance of Criteria When Choosing a Food Establishment



Importance of Criteria When Choosing a Service Establishment



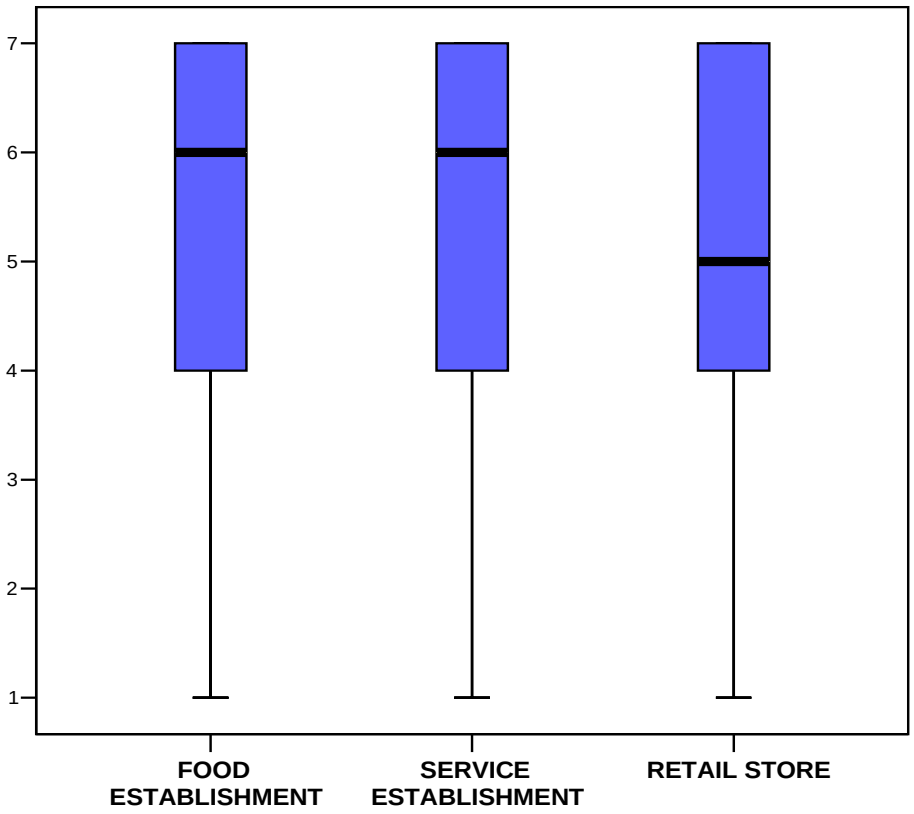
Importance of Criteria When Choosing a Retail Establishment



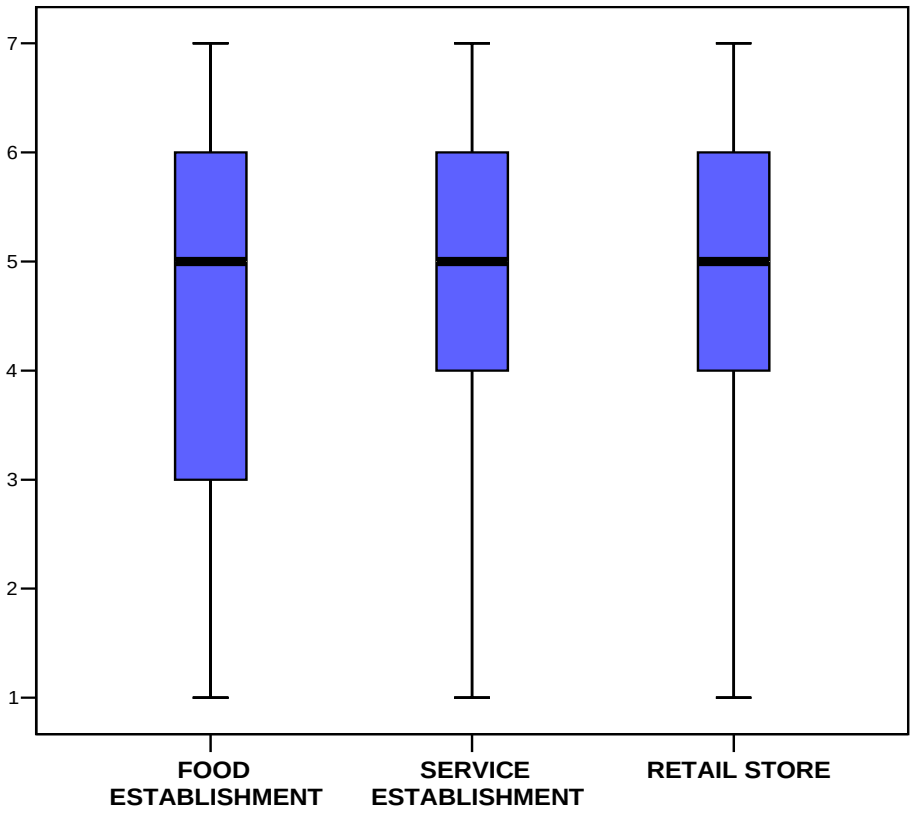
Box plots were also created for each of the seven criteria, based on the mean response for all three sectors. For the most part responses did not differ for toxicity, recycling, energy efficiency, water use efficiency, and environmentally friendly packaging, as seen in the charts below.

Importance of Toxicity Across Sectors

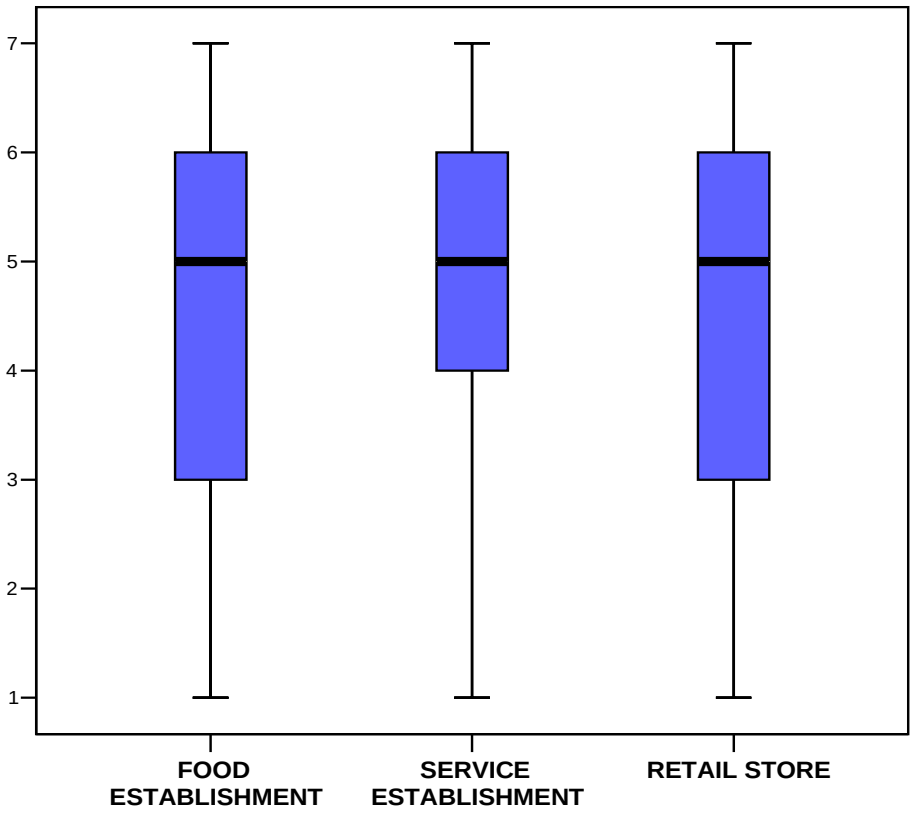
Importance of Recycling Across Sectors



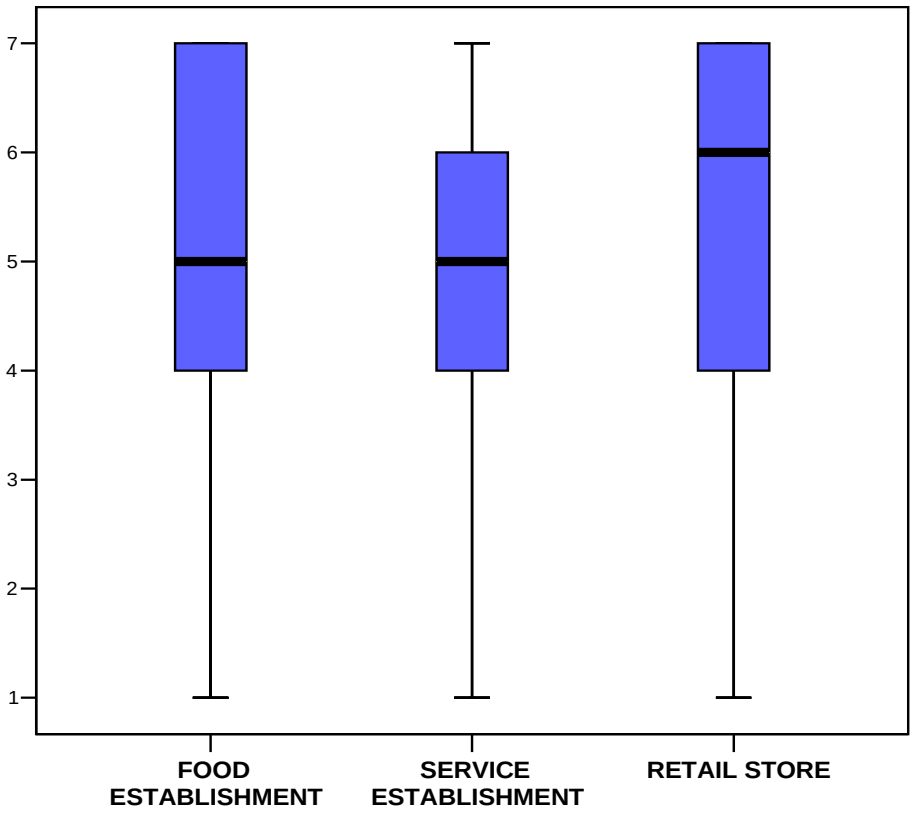
Importance of Energy Efficiency Across Sectors



Importance of Water Usage Across Sectors



Importance of Environmentally Friendly Packaging Across Sectors


7
6
5
4
3
2
1
FOOD ESTABLISHMENT
SERVICE ESTABLISHMENT
RETAIL STORE

Appendix F. Background: Greenopia

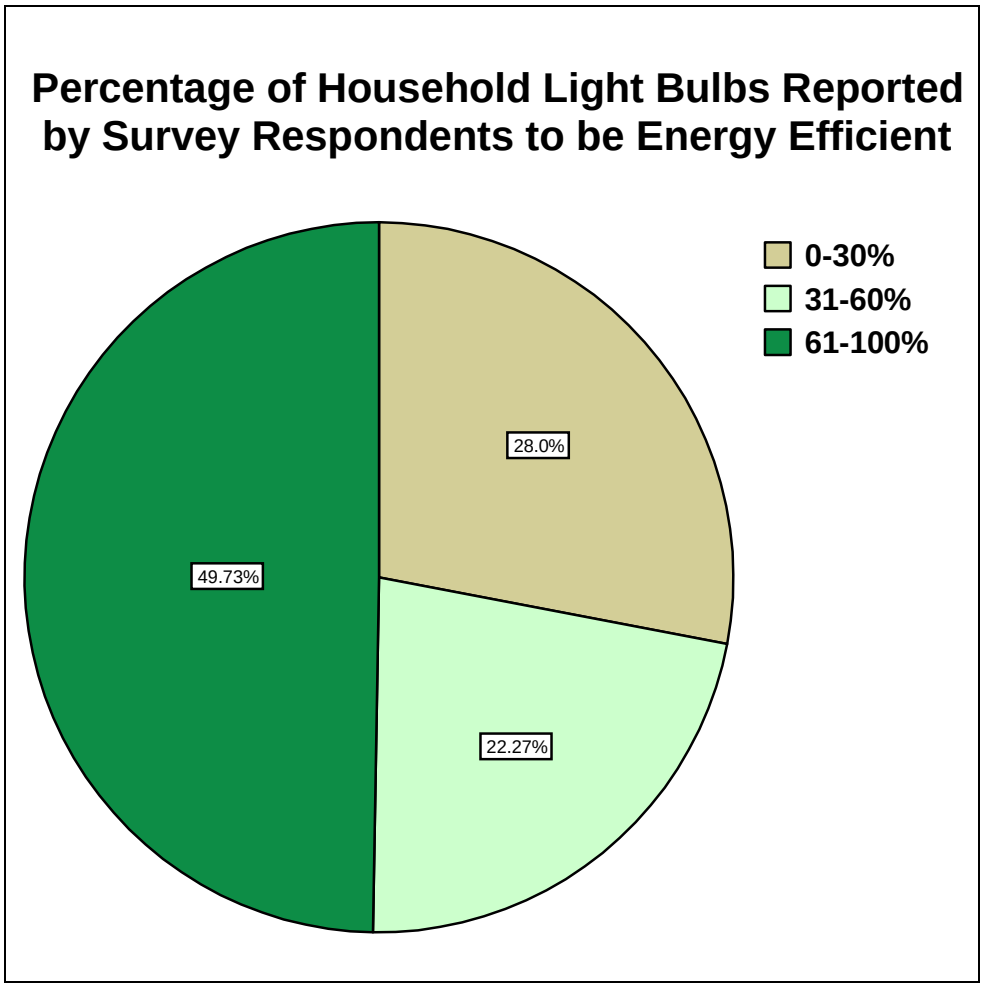
Greenopia was founded on Earth Day 2006 by Gay Browne in order to help consumers find green businesses in their local communities. Greenopia independently researches and publishes guides that rate the environmental performance of local businesses in major cities. Presently, Greenopia has guides out for Los Angeles and San Francisco and hopes to have completed a guide for New York City by April 2008. The guides are not static and are updated every 18 months to account for the quick turnover of businesses.

When Greenopia enters a city, it first researches all the local businesses and creates a list of potential listings for their guide. Researchers then set out on foot to canvas the city and evaluate the businesses on that list. Researchers can also add any businesses they deem appropriate for inclusion in the guide. A questionnaire designed to reveal the establishment's environmental performance is completed at each business by the manager or owner. The answers to these questionnaires are then entered into a database that calculates a 'leaf rating' for each business, ranging from one to four leaves, with four representing the "top" score. Greenopia also provides a subjective description of what services each business offers.

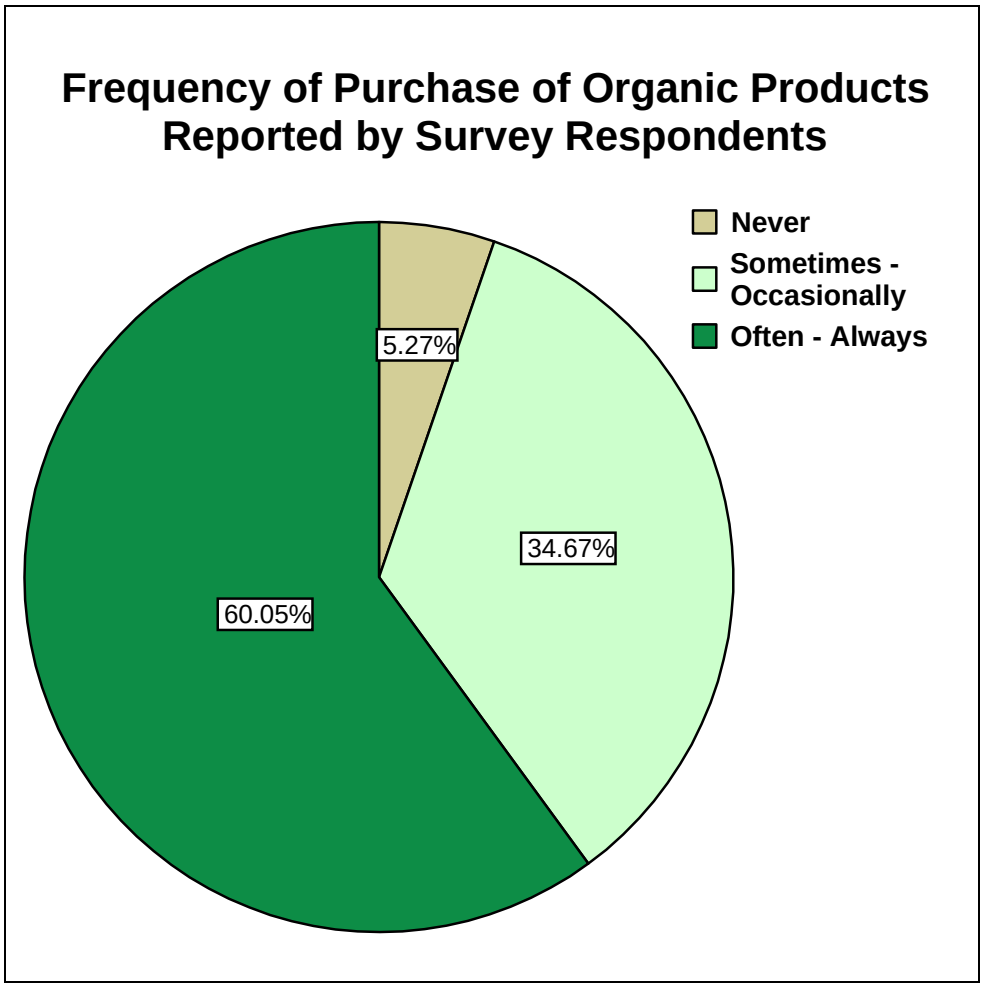
The quality of the information provided is checked first by a research coordinator who is trained to look for any discrepancies in the data. Greenopia also employs a council of experts who check the integrity of the data and the criteria that are used in each business category. Greenopia does not accept any paid advertising in its guide, and the majority of its revenue comes from sales of the guide. Greenopia does accept paid advertisements on its website, but only from those companies that share Greenopia's concern about environmental awareness.

For the future, Greenopia wishes to better align its criteria with consumer preferences and position itself as a trusted source of environmental information.

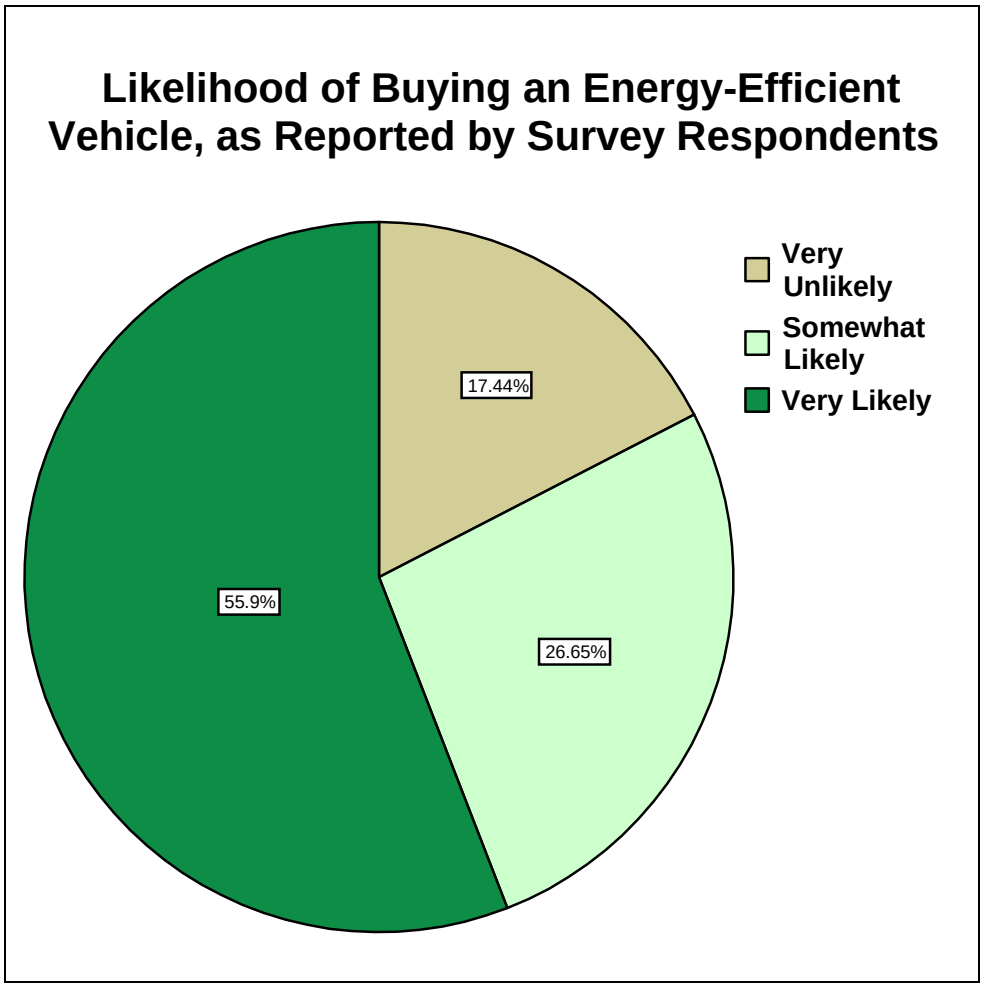
Appendix G. Pie Charts, Behaviors



Approximately half (49.7%) of the respondents reported that over 60% of the light bulbs in their homes are energy-efficient, with the greatest percentage (25.4) reporting that 76-90% of household bulbs are energy-efficient (Appendix A). Only 4.1% of the respondents do not own a single energy-efficient light bulb.



Just over 60% of the respondents answered that they purchase organic products at least every other time they go to the store (Appendix I). Only 5.2% reported that they never purchase organic products.



Nearly 56% of the survey respondents indicated that they would be very likely to buy a fuel-efficient car in the future (Appendix I). Just over 17% said they would be unlikely to make such a purchase, while nearly 27% indicated they would be somewhat likely to do so.

Appendix H. Literature Review

Life-Cycle Analysis/ISO 14000

Over the past few decades, there have been many different attempts to streamline an eco label that would be available for consumers. And while numerous attempts have been undertaken, there have not been many successful labels. Thus, it is important to understand the inherent pitfalls when considering an ecolabel.

First, there is the issue as to the source of the label. Ideally, the determinants of the label would originate from the government, but historically speaking, this often takes too long to be truly effective (Raines, 1992). Also, placing this burden on the government is especially difficult given the large and technical manner of a modern economy. Thus it may be unrealistic to hope that the government could accurately and efficiently regulate parts of the market in which it has little to no involvement. This problem could be alleviated by simply making the companies report their own information, but this too has not had much success.

Papers by Downs (1992) and Israel (1992) argue that such an approach often leads to gross misrepresentation of environmental impacts. This certainly seems more than logical when there is no incentive to properly report information (or also when there is no punishment for misrepresentation). This problem is further complicated by vagueness surrounding any labeling criteria. No one knows which criteria should be on a label or how far into the production cycle to look. ISO 14000 attempts to address these problems.

ISO 14000 utilizes a life cycle analysis (LCA) approach to the labeling problem. Specifically, in ISO 14020, there are nine principles from which environmental labels should adhere. These are listed as follows:

1. *Labels and declarations must be accurate, verifiable, relevant, and non-deceptive*
2. *Environmental attributes must be available to purchasers*
3. *Labels and declarations must be based on scientific methodology*
4. *Criteria for label/declaration must be available to all interested parties*
5. *Labels and declarations must take into account the life cycle of the relevant product or service*
6. *The administrative work must be limited to establishing conformance with criteria*
7. *Labels and declarations procedures and criteria must not create unfair trade restrictions or discrimination between domestic and foreign products or services*
8. *Labels and declarations procedure and criteria must not inhibit innovation*
9. *Labels and declarations standards and criteria must be developed by consensus.*

The previously mentioned papers seem to be most concerned with criteria 1, 3, 5, and 7. These authors seem to question whether these objectives can be realistically done. Downs and Israel argue that companies cannot create informative ecolabels without creating some sort of comparative advantage with foreign companies (criteria 7, in the above list). Furthermore, it should be noted that even if a company did adhere to all these criteria, there still may be other

socially related problems. Walmart, for example, is (or is becoming) a very progressive, environmentally friendly company. And while this may deserve some sort of accolade, this says nothing about their repeated human rights violations. When increasing the scope of the LCA lens to include developing countries, all of the sudden child labor, slavery, and hazardous working conditions become an issue. Without some consistent way of reporting labor conditions, we must be very careful that we do not substitute one problem with another.

In response to this problem, there have been several attempts by the LCA community to find some way of dealing with the labor aspect of production. GaBi 4.0 (one of the leading pieces of LCA software globally) has a feature in which labor can be evaluated based upon its social merits. With this inclusion, GaBi hopes to resolve the discrepancy. With all the controversy surrounding the validity of ecolabels it is probably best to try to solve problems before they occur. Ecolabels will be useless if consumers have no faith in them.

But overall, the ISO criteria should be useful when trying to streamline (or standardize) ecolabeling. And while a complete standardization may be problematic for regions with differing environmental focuses, it still may make sense to do so on an industry level.

ISO 14044 outlines the specifics of the LCA, LCI, and LCIA processes. Included is a comprehensive glossary of terms and guidelines in order to present an appropriate life cycle analysis. ISO 14044 should be useful when discussing and implementing any LCA characteristics into a labeling methodology. ISO is synonymous with LCA and is considered the gold standard for such analysis. It also helps that ISO contains both the LCA criteria and the proposed labeling guidelines. This keeps the terminology consistent and it also serves to keep the focus of the guidelines on a similar level.

Specifically within LCA, there are two problem areas when considering ecolabeling. The first is the use phase of the product. At best, producers can deduce statistics for the intended use of the product. But, there are few instances when this information can actually be retrieved. Aspects of the use phase can be collected when components of the product (or all of it) are collected. One example of this is motors used in mechanical tools (drills, saws, etc.). Producers have included a device that can report attributes of the tool's use. But, presently, this is not intended for any sort of heightened consumer awareness movement. It was instead a way for producers to know how much life was left in a motor and if it could therefore be recycled. But this example does illustrate that there may be producer benefits from understanding more of the use phase of their product.

The other potential pitfall for ecolabeling is the disposal phase of the LCA. Once again, the impact of this phase can often depend on the consumer's behavior. The environmental impact can be orders of magnitude greater or smaller depending on where/how the product is disposed. And since this is a key phase of LCA, this is especially troubling. Some companies have addressed this issue by collecting and recycling their product. This is also common for

types of packaging and for certain types of metal (aluminum, steel, etc.). Strongly linked with ISO, Europe has adopted two directives to help quantify and control the disposal phase.

The WEEE and ROHS directives act as guides for disposal of products. Specifically they deal with hazardous chemicals and electronics equipment. And while these directives may be very narrow in focus, some of their guidelines may be useful when considering other products.

In the U.S., the Federal Trade Commission (FTC) has adopted its own set of criteria that deal with the disposal phase of the life cycle. (Their analysis is not entirely in line with ISO/LCA, but it is still relevant.) The FTC breaks disposal into five categories that can be labeled on the product. These categories include: degradable/biodegradable; compostable; recyclable; refillable; and, ozone-friendly. The FTC goes on to specifically define these criteria and has designed its methods in order to limit any loopholes for consumers to find. Like ISO, the FTC also is constantly addressing the issue of misleading information.

International Eco-Labeling

There is a vast number of labeling schemes out there, predominantly in Europe, yet "no single label covers all aspects of sustainability", according to the UK's Department for Environment, Food and Rural Affairs (DEFRA). DEFRA also notes there are instances where a label does not address all the concerns of the consumer, and other areas where there is no labeling scheme in existence at all. Ecolabels can be self-assigned or awarded based on company self-reporting, or third-party entities can do the review/assessment/designating process.

There are many examples of third-party review, particularly internationally. The Swiss chemical company BASF AG has their products evaluated by a stringent process called Eco-Efficiency Analysis, comprised of third-party review and internet publication, with reviews every three years. In the UK the government formed the Carbon Trust to help companies find ways to reduce their carbon footprint. According to their website, two-thirds of consumers want to know the carbon footprint of the products they buy. The Carbon Trust labels indicate the number of grams of CO2 used in the product's manufacture, delivery, and disposal, and the manufacturer must also pledge to reduce that number before being certified.

Also in the UK is the Ethical Company Organization (ECO), which claims to be the UK's only corporate-level Ethical Company Accreditation Scheme. Research teams analyze records of applicant companies based on 15 criteria dealing with their treatment of animals, environment, and people. The Ethical Company Accreditation is awarded to the top 33% of companies in each individual sector, a departure from the typical ecolabeling program. Those companies are then listed prominently in the Good Shopping Guide and on the ECO website, and are also allowed to use the ECO logo on their letterhead, advertising, emails, packaging, etc. The Good Shopping Guide is supposedly the "world's best selling ethical shopping reference book, providing clear and extensive ethical shopping ranks across 60 trade sectors." The guide includes detailed brand/company tables from all consumer sectors.

Closer to home, Canada has an extensive labeling program called Environmental Choice, and it is recognized as "North America's most widely recognized and respected multi-attribute environmental certification mark." This is a much more extensive labeling program, however, dealing with over 300 different products. In addition to third-party certification, the group also provides consulting and information support, advertising and promotion, and market research services, a slightly different approach from the usual ecolabeling programs. Interestingly, the website reports that in a 2005 customer survey, 97% reported a benefit to their sales and market from participation in the program. The criteria for certification for most products are listed on the organization's website. The Governments Incorporating Procurement Policies to Eliminate Refuse (GIPPER) is a committee compromised of purchasing agents from government and private associations, with the aim of incorporating environmental factors into purchasing decisions in an effort to reduce waste.

Another product-specific label that is also very widespread is the French Eco-cert program, which investigates and certifies natural and organic cosmetics in 80 different countries for shipment to Europe, the US, and Japan. This website is comprehensive, including a PowerPoint on specifically how a company can apply for certification and the process involved. The association was formed in 1991 and accredited in 1996. Certifications are in adherence with ISO 65, and the standards have been approved by the French Ministry of Industry. Products are labeled either Natural or Natural & Organic, depending on the percentages of organic certified ingredients and of vegetable ingredients. Again, this website goes into tremendous detail of the certification process and could be an excellent model of how to do this right.

Eurepgap is actually a private sector organization that certifies agricultural products from all over the world. The Euro-Retailer Produce Working Group (EUREP) began the program in 1997 in an effort to standardize agricultural certifications. It is apparently one of the few international certification programs to be financially and politically independent from the public sector. They accredit third-parties to do the actual investigation/certification, of which there are currently 100 operating in 70 different countries. The entire process, from planting of seed to delivery of product to supermarket shelves, is analyzed. However, this process is different in that it is a business-to-business label, and is not visible to the consumer, which is somewhat surprising as one of the goals is to maintain consumer confidence in product safety and quality

In 2002 the International Association Natural Textile Industry (Germany), Soil Association (England), Organic Trade Association (US), and Japan Organic Cotton Association met in a similar effort to minimize confusion over organic cotton and textile standards. They devised the Global Organic Textile Standard in 2005, based on a number of key criteria, including a majority composition of organic fibers, toxicity and biodegradability requirements, the absence of toxic heavy metals or formaldehyde, existence of environmental policies in the manufacturing sites, social criteria (based on ILO key criteria); and on-site inspection and residue testing. In their article on organic cotton labelling, Nimon and Beghin (1999) discuss how the price increase is handled from the supplier/retailer end rather than from a customer response/request basis. From an extensive online search of catalogues, they found an average of 33.8% mark-up of

apparel price bearing the "organic" label. They write, "from a conservationist perspective, eco-labels are educational tools to inform consumers about the environmental impacts of the labelled product, and thereby induce a change in purchasing behaviour that mitigates the product's environmental damage." They also propose that parents may be more inclined to purchase organic infant clothing over concern about pesticides, etc. used with traditional cotton-growing practices.

Similarly, the Forest Stewardship Council sets global standards for wood products. "Smartwood" and "Rediscovered Wood" are two labels, the first for those products certified by the Rainforest Alliance, and the second for those products that use recycled, reclaimed, or salvaged wood.

Economic models and perspectives of ecolabeling were explored in the articles by Nunes et al. (2005) and Mason et al (2006). The latter article presents a detailed study of three different approaches to ecolabeling, with the general conclusion that an increase in certification test cost or accuracy leads to an increase in the number of vendors who seek certification and in their subsequent production of goods. From a policy perspective, this is important to know – you want to persuade green sellers to produce more and "brown" sellers to produce less, and one way to do this apparently is to have more accurate or more expensive certification tests. This is applicable up to a point; if a test becomes too expensive, then only green producers will choose to be certified, with no incentives for brown producers to "switch colors". Additionally, the authors refer to the promise of certification as an alternative way to deal with the externalities of brown technology/production.