

Sustainability in Packaging

a study of trends, ideas, and perceptions of sustainability as it relates to packaging

By Leslie Herrmann

Graphic Communication Department
College of Liberal Arts
California Polytechnic State University
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Leslie Herrmann
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Advisor: Dr. Xiaoying Rong

The consumer packaging world has two key players, the consumer and the packaging manufacturer. And with the outside perspective of an expert on sustainability there creates the chemistry currently operating the sustainable packaging movement. But what does sustainability mean? The quick, dirty, and official definition is something which “meets the needs of the present without compromising the ability of future generations to meet their own needs” (www.sustainability-ed.org).

This study focused on what the consumer perceived as being sustainable as well as tested some consumer knowledge of what sustainability is. This was then contrasted with what some award winning packaging manufacturers were doing in the field of sustainable packaging, which was further looked at from the perspective of what experts believed to be the correct course of action to make packages sustainable.

Results showed that many consumers were not as well educated on the subject of sustainability and many still based their purchasing decisions not on what they believed would have the smallest affect on the environment. In contrast to this, manufacturers were doing better than expected. There was very little greenwashing and a lot of honest attempts to get as close to being sustainable as possible. The expert analysis showed that everything has an up and down as far as its environmental impact as well as proving that consumer really must think critically when popular words such as “biodegradable” are used.

In conclusion it was discovered that the problem of making packages sustainable is not black and white, but entirely a gray area. Consumers do need to become more informed, but in the interim manufacturers are becoming more and more responsible and acting in accordance with sustainability and attempting to make products that mesh with experts opinions.

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Introduction and Purpose

Sustainability, environmentally friendly, and “green” are becoming the popular words in commerce and society. As many industries and markets are declining, for example newspapers; what can companies do to make sure that they make survive the next few decades? One way is to look into making a company products as sustainable and green as possible.

One area that is simply not going to disappear is consumer packaging. However, this area needs to appeal to a constantly more informed consumer so that the product continues to sell. This study explored what the consumer perceives as being green packaging and compared that to what some green packages manufacturers are creating. This study investigated what actually makes a package green and how that compares to what consumers believe and what manufacturers are doing.

Consumers are often influenced by pop culture and, therefore, their idea of green may be determined by what is currently popular. For example, a product bottled in glass is seen as being organic, fresh, and manufactured by an environmentally friendly company. However, while glass itself is very sustainable, it is heavier than plastic and has much more expensive transportation costs. It is difficult to determine what condition is more damaging to the environment; fuel for transportation or waste in the landfill. There are many other similar situations where the green solution may be difficult to determine. In these cases, the consumer may not actually know what is more green. Consumers will tend towards whatever thought is popular no matter what may actually be green. Consumers are also swayed by what is written on the package describing how the package is green. Lastly, the consumer idea of green may be simply what packaging is recyclable or reusable.

Out of necessity, many manufacturers probably try to appeal to what the consumer believes to be green. Companies ought to spend money on research to find the most environmentally friendly options. There are cases of companies having traded a reusable package for one that is not reusable because the carbon footprint of manufacturing the non-reusable package was smaller than that of the reusable one. While the company may not have been appealing to the consumer’s idea of green, this company was willing to spend the time and money to make an informed decision to

be sustainable. This is what companies ought to be doing. However, this study explored manufacturers tendency to simply appeal to the consumer no matter what packaging may be more green.

Finally, this study investigated what actually makes a package green. This probably depends on the situation, as the case with the glass packaging, and hopefully is determined by the company for their specific product through research. In the case of companies that are actually being as green as possible, they are probably doing comparison studies and relying on what experts in the packaging field are saying.

The purpose of this study was to expand knowledge of what green is and to enable making intelligent choices about packaging. The purpose included bringing to light to the many misconceptions that consumers have about what is good for the environment.

Literature Review

Sustainable and green are basically interchangeable words when referring to the environment, but what do they mean? The most popular definition currently is defined as being something which “meets the needs of the present without compromising the ability of future generations to meet their own needs.” This definition was provided in 1983 when the United Nations set up what is known as the Bruntland Commission to look into global environmental issues (www.sustainability-ed.org). However, based off this definition it is difficult to determine what is needed from the packaging industry. The Sustainable Packaging Coalition helped to set up a more specific definition to help manufacturers focus on exactly what a sustainable and green package is. According to the Sustainable Packaging Coalition’s web site, www.sustainablepackaging.org, a sustainable package must meet several requirements:

- The package must be beneficial, safe and healthy for individuals and communities throughout its life cycle
- The package meets market criteria for performance and cost
- The package is sourced, manufactured, transported, and recycled using renewable energy
- The package maximizes the use of renewable or recycled source materials
- The package must be manufactured using clean production technologies and best practices
- The package must be made from materials healthy in all probable end-of-life scenarios
- The package must be physically designed to optimize materials and energy
- The package must be effectively recovered and utilized in biological and/or industrial cradle to cradle cycles.

While this definition may not be a global idea, the Sustainable Packaging Coalition is a leader in consulting for businesses in the United States. Other ideas of what green is depends greatly on the person and the cultural perspective.

While the definition of sustainability may be debated in industry, companies have access to web sites like the Sustainable Packaging Coalition to help them define the term. However, the idea of sustainability may not be commonly known to the average consumer. Research was performed by Perception Research Services into what exactly consumers believe when it comes to sustainable packaging. They discovered that 16 percent of people in the United States stated that they had a good idea of what sustainable packaging meant. Compare that to 15 percent of people in the United Kingdom, 19 percent in Germany, and 35 percent in China. What is really surprising is that one person surveyed believed that “sustainable means the package is not biodegradable and stays with us forever,” when that definition is clearly opposite of the actual definition of sustainability (Young, 2008, p.42).

From the research performed by Perception Research Services one can see that consumers may not understand sustainability. But is that really the consumers fault? Many companies have begun to exaggerate how environmentally friendly many of their products are, making it difficult for consumers to determine what products are packaged in the most sustainable container. For example, in the article by Anne Johnson, “Communicating the Recycling Message is Harder than it Seems,” she notes that while a tooth brush in a clamshell package, a stiff plastic package which when folded over on itself forms the cavity for the product, touts that it is made with recyclable packaging materials, even though the materials are not actually recycled by most cities. This is a very good example of what is known as “greenwashing.”

“Greenwashing” is defined by TerraChoice, a leader in investigating green claims, as “the act of misleading consumers regarding the environmental practices of a company or the environmental benefits of a product or service.” In 2009, TerraChoice organized a survey of products in North America and found that 98 percent of the products were guilty of one of the seven sins of greenwashing. The seven were put together after a similar survey was conducted in 2008 and they outline some specific ways that consumers can identify products that may be greenwashed. The following are the seven sins as well as their description as provided on page three of the report published by TerraChoice “The Seven Sins of Greenwashing; Environmental Claims in Consumer Markets:”

- Sin of the Hidden Trade-off, committed by suggesting a product is ‘green’ based on an unreasonably narrow set of attributes without attention to other impor-

tant environmental issues. Paper, for example, is not necessarily environmentally-preferable just because it comes from a sustainably-harvested forest. Other important environmental issues in the paper-making process, including energy, greenhouse gas emissions, and water and air pollution, may be equally or more significant.

- Sin of No Proof, committed by an environmental claim that cannot be substantiated by easily accessible supporting information or by a reliable third-party certification. Common examples are facial or toiled tissue products that claim various percentages of post-consumer recycled content without providing any evidence.
- Sin of Vagueness, committed by every claim that is so poorly defined or broad that its real meaning is likely to be misunderstood by the consumer. 'All-natural' is an example. Arsenic, uranium, mercury, and formaldehyde are all naturally occurring, and poisonous. 'All natural' isn't necessarily 'green.'
- Sin of Irrelevance, committed by making an environmental claim that may be truthful but is unimportant or unhelpful for consumers seeking environmentally preferable products. 'CFC-free' is a common example, since it is a frequent claim despite the fact that CFCs are banned by law.
- Sin of Lesser of Two Evils, committed by claims that may be true within the product category, but that risk distracting the consumer from the greater environmental impacts of the category as a whole. Organic cigarettes are an example of this category, as are fuel-efficient sport-utility vehicles.
- Sin of Fibbing, the least frequent Sin, is committed by making environmental claims that are simply false. The most common examples were products falsely claiming to be Energy Star certified or registered.
- Sin of Worshiping False Labels, committed by exploiting consumers' demand for third party certification by creating false labels or false suggestions of third party endorsement.

It is easy to see that there are many places where consumers can be tricked into believing that a package or product is green when it may not be. Unfortunately, there currently are not any regulations in the United States to help prevent greenwashing. The Federal Trade Commis-

sion (FTC) is in the process of updating the Green Guide for consumers, which has not been changed since 1998, but that is still not as far as other countries have gone to eliminate greenwashing. For example, Norway has banned all car ads from using the terms 'green', 'environmentally friendly,' or 'clean' since all cars contribute to global warming. However, there has been a site, www.greenwashingindex.com, that has been set up by the marketing consultants EnviroMedia which allows the public to post ads and rate how green the product actually is. While many of the contributions to the web site are not by professionals, it still offers an opportunity for consumers to go and read what others see as fallacies in ads and hopefully become more sceptical if not more educated (Walsh, 2008).

Not all companies are greenwashing their products. Some are honestly trying to create a greener, more environmentally friendly product. This is a necessity for many companies, despite the fact that there are consumers who do not know what sustainability is, there are many consumers that do. In fact, according to a 1990 survey, "78 percent of the American public, compared to 64 percent in the prior year, would pay five percent more for an environmentally friendly package" (Underwood & Todd, 1990). It is not difficult for one to imagine that the percent of Americans willing to pay more for environmentally friendly packages has increased since 1990. In addition to consumers being willing to pay more, consumers are also more interested in recycling. Three quarters of all Americans recycle and are interested in doing their part in being environmentally friendly (Weeks, 2007). This just shows that manufacturers need to be green to continue to appeal to consumers and continue to succeed.

Since several definitions of sustainability and green have been laid out— both from the perspective of the consumer as well as what some leaders in the green packaging industry are defining as sustainable, it is important to finalize with what it means to be sustainable to the packaging manufacturer. Already discussed was the importance of appealing to the consumer, but there is one other reason why manufacturers should be interested in creating sustainable packages. That reason is to put green in their bank accounts. Limiting the amount of materials used for packaging not only helps the environment, but also helps reduce costs of raw materials. Reducing packaging can also reduce shipping costs for companies (Kassaye & Verma, 1992). Basically, being sustainable can help save companies money, although perhaps simply the desire to be sustainable in order to support future generations should be a good enough reason for packaging manufacturers.

Research Methods and Procedures

This study encompassed three areas of research. The first area of research was to discover what consumers believe to be green packaging. The second area of research was to discover how packaging companies are approaching the creation of a green product. The final area of research was to discover what experts in the packaging field are defining as green packaging.

The research in the first area was performed through descriptive research by conducting a survey of the average consumer with varying ages and incomes. The second area of study used historical research and consisted of case studies of companies which are featured on the Sustainable Packaging Coalition's web site. The last area of study was performed with historical research on how experts in the field are defining green packaging. Finally, the research concluded with content analysis, relating all the research back to the research question.

The descriptive research survey being conducted determined how consumers view green packaging through a sample survey of tangibles, studying only a sample of the consumer population. A sample survey is a type of survey that studies only a portion of the of the population. The data collected was all be tangible data, meaning that it would merely discover if a consumer believed that one package is more green than another (Levenson, 2001). The survey was created electronically, using the tools available on www.surveymonkey.com and distributed through the site as well. Links to the survey on www.surveymonkey.com were distributed via e-mail and Facebook.

The group of consumers surveyed were wide and random, consisting of people of various age ranges and genders. The questions were posed are as follows:

Part I of Survey: Demographics

Age?

Younger than 18

18-25

25-35

35-45

45-55

55 or older

Gender?

Male

Female

Occupation?

Student

Part-time employee

Full-time employee

Unemployed/Retired

Part II of Survey: Do Consumers Consider Sustainability when Purchasing

Which product would you rather purchase?



Product A



Product B

Which product would you rather purchase?



Product C



Product D

Which product would you rather purchase?



Product E



Product F

Which product would you rather purchase?



Product G



Product H



Product I

Prioritize what you considered as you picked
which product you would rather buy:

	Most important to me		Least important to me
Familiarity with brand			
Graphic design of package			
Materials used to create package			

Part III of Survey: What Packages do Consumers Consider Sustainable?

Which package do you consider most environmentally friendly?



Package A



Package B

Which package do you consider most environmentally friendly?



Package C



Package D

Which package do you consider most environmentally friendly?



Package E



Package F

Which package do you consider most environmentally friendly?



Package G



Package H



Package I

What do you consider the most important fact when deciding what packages were the most environmentally friendly?

	Most Important factor			Least Important factor
Materials Used				
Size of Package				
Shape of Package				
Manufacturing process used to make package				

Part IV of Survey: Testing Consumer's Knowledge

What does this image mean to you?



That the package is recyclable

That the package is made with a specific plastic

That the package is made from post consumer waste

All of the above

None of the above

Have you heard the term “sustainable” before?

Yes

No

If you have heard the term “sustainable,” how do you define it?

The first section of the survey was just to get an understanding of who took the survey. The second section of the survey will answered what consumers look at when they purchase a product. It specifically addressed if consumers are really thinking about the sustainability of a package when they purchase a product. The third part of the survey answered what types of products consumers believe to be the most sustainable as well as what factors they think contribute to the sustainability of a package. The fourth part of the survey simply gauged the knowledge of consumers. The content analysis of the survey was conducted through observing the quantitative results and their relationships with the graphs provided by www.surveymonkey.com.

The second area of research was conducted using historical research. Historical research is a method of establishing facts and arriving at conclusions concerning past events. By understanding the past, it is easy for one to infer what some possibilities for the future may be. The specific type of historical research performed was case studies. A typical case study involves a detailed

look into one individual, small group, or company. The emphasis is on understanding the reasons why an individual or group does certain things and how the present actions relate to potential future actions (Levenson, 2001).

The case studies performed were two of the packages featured on the Sustainable Packaging Coalition's web site. The entire list of which is located at <http://spcdesignlibrary.org/items/index>. Also included were two of the winners of the Greener Package 2009 Award Competition as presented by the October 2009 edition of *Package Design*. The two packages from the SPC web site are: Grand Pré's Cream and Artisan Wine Company's Painted Turtle Wines. The two packages being featured from *Package Design* are: Aveda's Vintage Clove Shampoo and Frito-Lay's Sun Chips. These four packages were chosen as they were similar to the packages consumers were being asked about in the survey. The information from the case studies was used to make a conclusion on what leaders in the manufacturing of green packaging industry are doing by objectively considering what all the companies have in common. The case studies were also compared to what consumers believe about similar packages.

The final area of research conducted was historical research. To understand what some experts in the field of sustainable packaging the article "Biodegradable is one of Packaging's Most Misused Terms," published by *Packaging Digest* in 2008 was looked at in conjunction with Susan E. M. Selke's book "Packaging and the Environment". These two sources give a good recommendation of how packaging creators should be approaching sustainable packaging. From this research, common trends were noted to determine what may be the best sustainable packaging currently available. Based off this research, future trends were identified and helped to bring the study to a close by knowing what the future for sustainable packaging might hold.

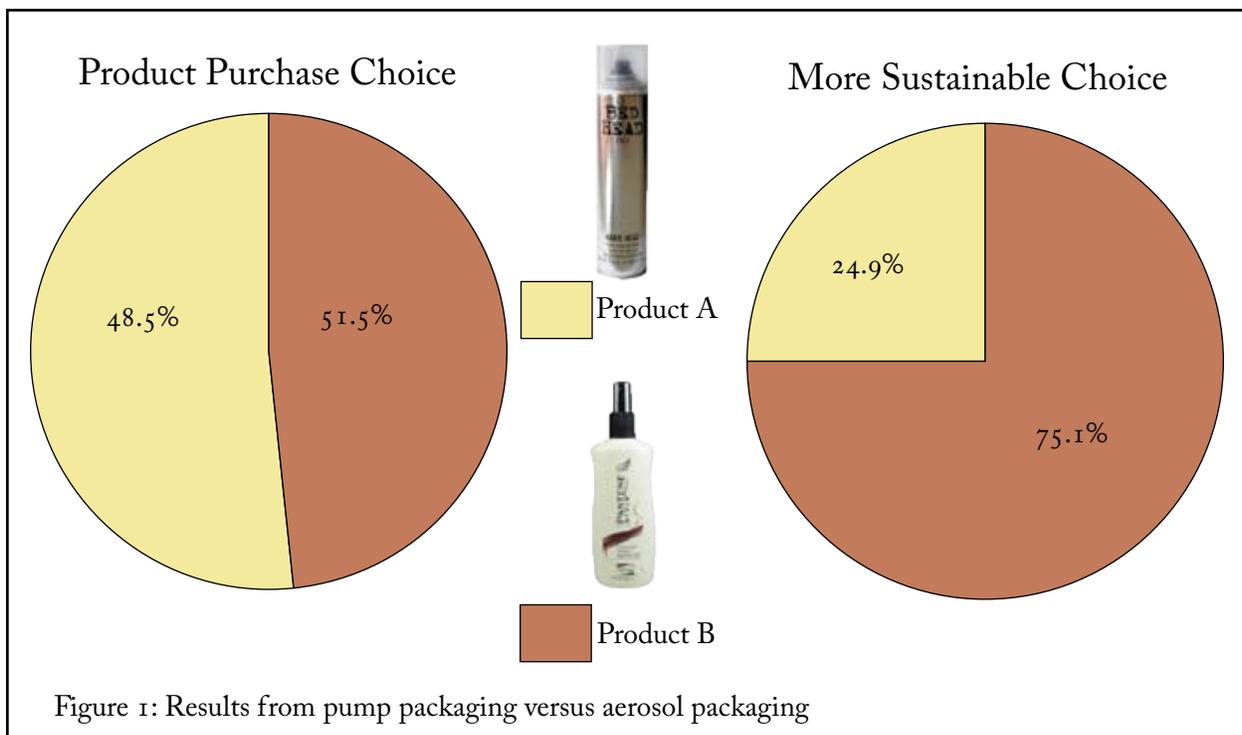
Together, all areas of research provided information about what the consumer, the manufacturer, and the expert have to say about sustainable packaging. This highlighted differences and similarities between what the consumer and manufacturer are doing as well as highlighting any discrepancies with what the expert recommends as being actually sustainable.

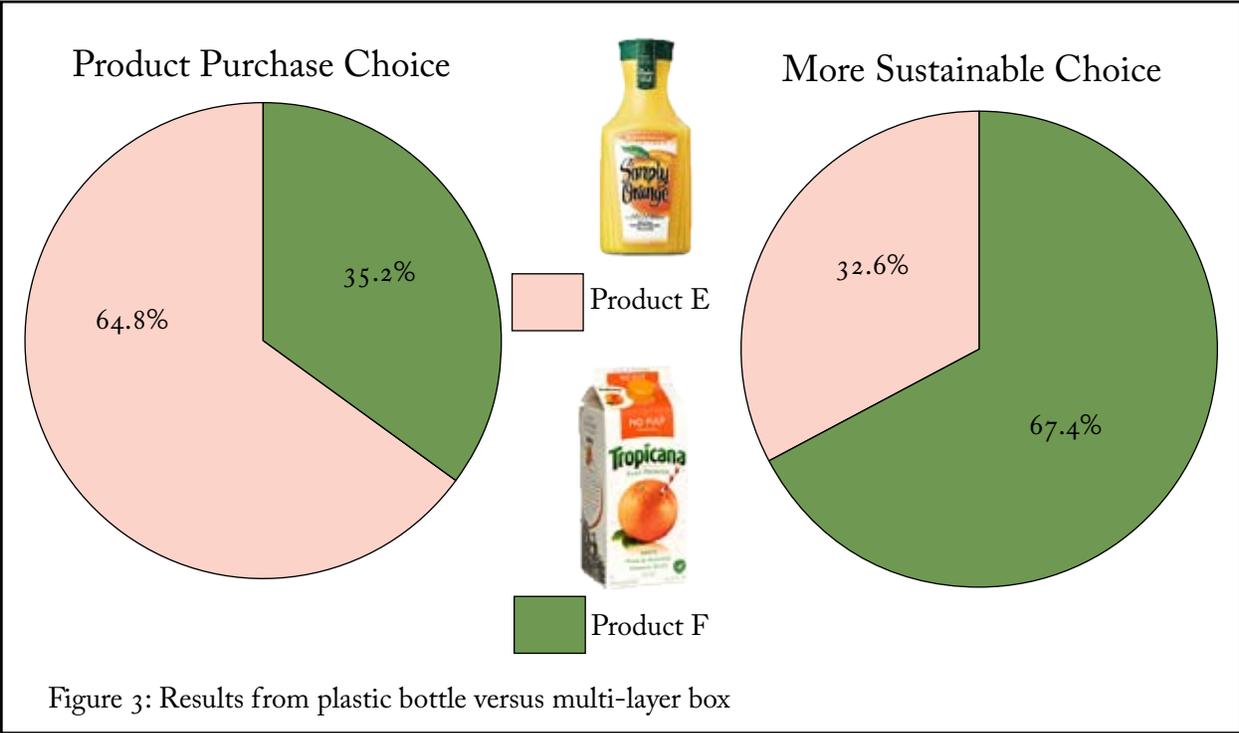
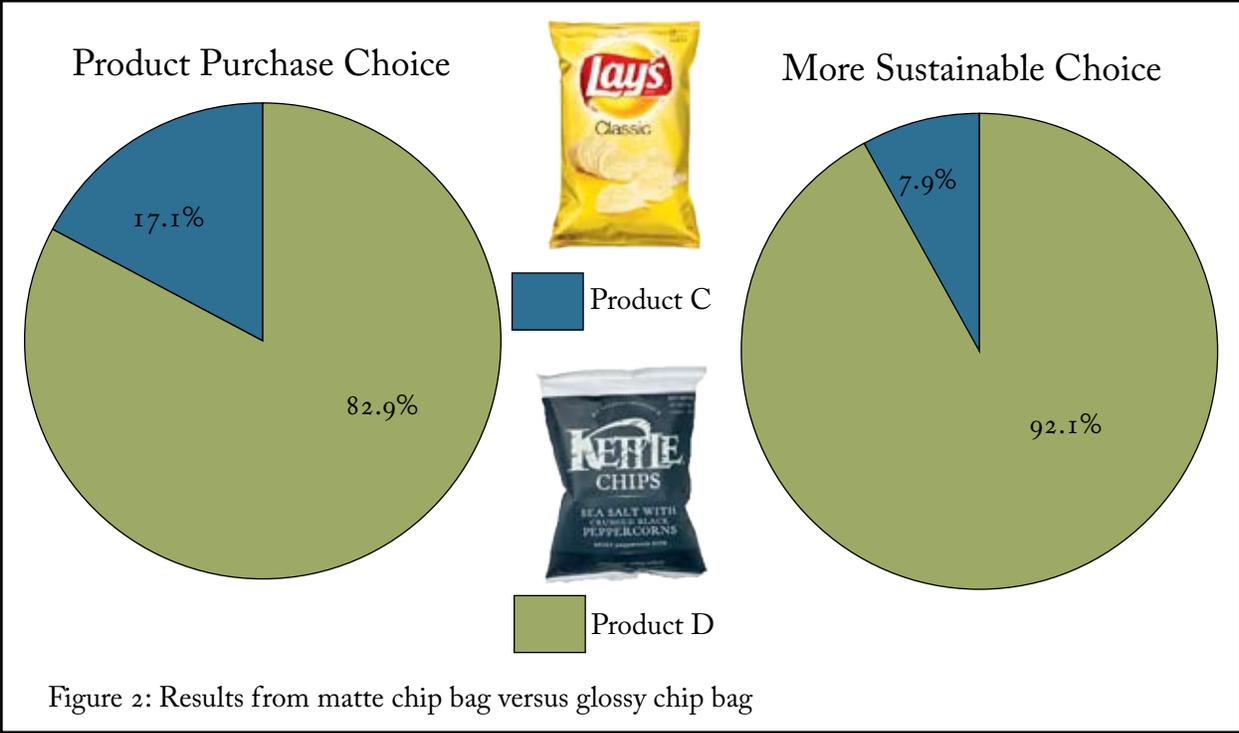
Results

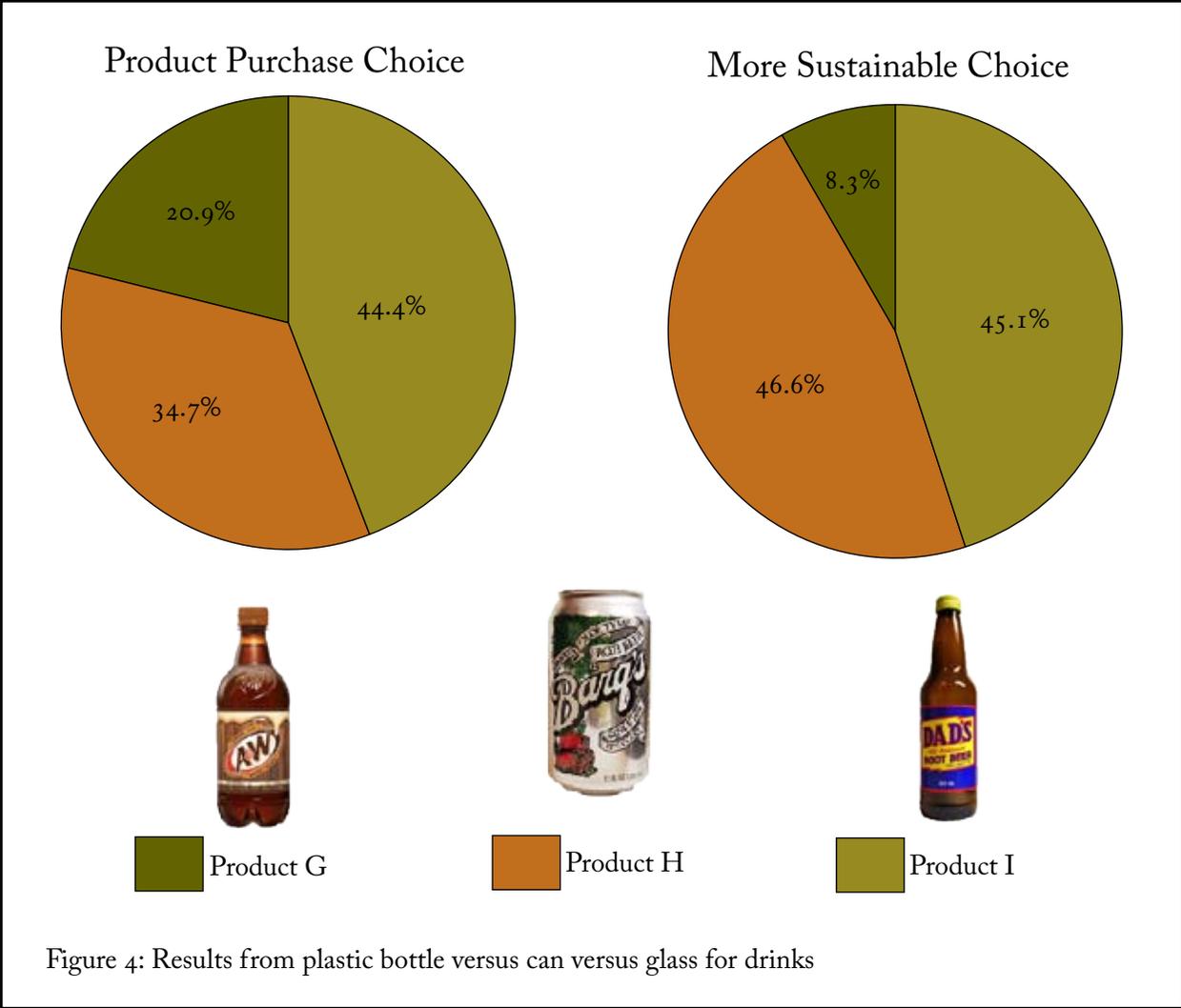
Survey Results

Part I of the survey indicated that 69.1 percent of all those who took the survey were in the age range of 18-25. Seventy point five percent of the survey takers were female and 65.3 percent were students.

The results of part II and III will be shown together so as to emphasize any contrast. The tables titled Product Purchase Choice are the results from the question “Which product would you rather purchase?” The tables with the title More Sustainable Choice are the results from the question “Which package do you consider more environmentally friendly?”







The last question in Section II and III of the survey asked how the participants picked their answers to the previous questions in that section of the survey. In part II, survey participants were asked to rank what was most important to them as they were picking which product they would rather purchase. The majority of people listed “familiarity with brand” as being the most important factor in their choice. Most participants listed “materials used to create the package” as the least important factor in their decision. In the middle, fell “graphic design of package.”

In part III, the last question asked participants to rank what was the most important factor in determining sustainability. Follows is the order that participants ranked the answers starting with what they noted as the most important factor: “materials used”, “manufacturing process used to make package”, “size of package”, and least importantly, “shape of package”.

Part IV of the survey tested consumer's knowledge of sustainability. The majority of survey participants, at 44.8 percent, got the correct answer to the question about what the chasing arrow symbol means on plastics. Which is, of course, that the number denotes what type of plastic the package was made out of. Twenty two point four percent listed that the symbols mean that a package is recyclable. One person listed that the symbol means the package is made from post consumer waste. Thirty point seven percent listed that all of the answers listed were correct, while 1.6 percent listed that none of the answers were correct.

Most participants, at 91.1 percent stated that they had heard the term "sustainable" before. However, most of the definitions listed were vague, defining sustainable as "Environmentally friendly" or "green, eco friendly." Nineteen participants mentioned recycling in their answer, which was the most common word used as a description beyond the "Environmentally friendly" type answers. Some people either did not understand the question or took the term "sustainability" out of context and said that sustainability meant "something that is durable," although they could have been referring to the environment being durable and hopefully not a product. There were three textbook answers similar to "meeting today's needs without compromising the ability to meet the needs of future generations." There were two answers which were correct and stated in the participants own words. One of the two impressive answers was: "responsible practices that reflect thought or consideration for future resource depletion. Something is sustainable if it can sustain itself. A circular model."

Case Studies

Aveda's Vintage Clove Shampoo is a contrast to the aerosol versus pump question in the survey. While it is not the type of product which would be put in a spray type bottle, it does show a beauty product that has won some awards in the sustainability arena. Plus, the packaging is very similar to a pump package as is sometimes used with hairspray. All information listed came directly from the *Packaging World* article featuring the winners of the Greener Package Awards in October 2009, of which include the shampoo bottle.



Figure 5: Aveda's Vintage Clove Shampoo

The package was launched September 2008 and has overcome some challenges in the packaging industry thought to be impossible. First off, the bottle itself is made with 96 percent post-consumer recycled (PCR) high density polyethylene (HDPE). The high amount of PCR in the bottle is provided mostly by recycled milk jugs and contains the highest percentage of PCR HDPE content to date. Most of Aveda's bottles contain only 80 percent PCR content. A final advantage of the bottle is that it is recommended for curbside pickup.

In addition to the bottle, the cap has received attention. The cap is made from 100 percent PCR polypropylene (PP). This is very impressive as there is no recycling chain in the US for PP, meaning Aveda had to establish a nationwide Cap Collection Program. Aveda involved youth organizations and schools to help collect 150,000 pounds of plastic which were ground down into new resin for the caps to the Vintage Clove Shampoo bottle. The mold for the caps was special as the 100 PCR PP would not act the same as virgin PP, but the closure came out better than Karen Bopp, the administrator of corporate packaging innovation for Estée Lauder (Aveda's parent company) had expected it to. The closed-loop system won Aveda a lot of attention as it is one of the best ways to recycle and reuse.



Figure 6: Frito-Lay Sun Chips

Sun chips were also featured in Packaging World as a winner of the Greener Package Awards. This package may, of course, be contrasted with matte versus glossy chip bag part of the survey.

This package was chosen for the award for the strides the developer has made in the direction of creating a 100 percent biodegradable package. As of April 2009, the outermost layer (of three layers) is manufactured with polylactic acid (PLA) film. This film has two advantages. First, is the PLA replaces what would have been virgin non-renewable petroleum based PP. Second, it offers the capability of reducing solid waste through the potential of biodegrading.

Currently, the whole pillow pouch is not made from PLA or biodegradable as there are two other layers to account for, however the eventual goal is to have the whole bag be compostable.

There were several problems that had to be overcome in order to make the PLA layer a reality. First, the film had to be acceptable for packaging snack products. Plus, senior management set the bar high, saying that the material had to be able to be processed on all current machinery and equipment. Once a film was found, special procedures and conditions to print and laminate the films had to be discovered as the film behaved much differently than regular PP. Color standards also had to be re-established because Frito-Lay wanted the bag to have a matte finish. Once all these challenges were overcome, the product as pictured became available on the shelves with one layer being biodegradable. Notice that the bag as pictured in Figure 6 looks the same as many other chip bags.

In 1989, the aseptic processing and packaging of foods began to see attention. It is still renowned for having energy savings over polyethylene terephthalate (PET) type bottles and has undergone some improvements since 1989. The Grand Pré cream packaging was showcased by SPC which features winners from packaging award programs. All information about this package was provided by <http://spcdesignlibrary.org>.



Figure 7: Grand Pré Cream

The biggest savings when one considers aseptic packages versus PET bottles is that aseptic packages do not need to be refrigerated. The packaging process eliminates the need for refrigeration, which is associated with a greatly reduced carbon footprint as compared to a PET bottle. Aseptic packages also require less energy to manufacture. In the case of the cream, the package actually takes less resources to manufacture than the package. Another large advantage of aseptic packages versus PET bottles is that they occupy less space in a landfill. PET bottles have the landfill density of 355 pounds per cubic yard while aseptic packages have 500 pounds per cubic yard, meaning that 500 pounds of aseptic packages will fit in a cubic yard of space. Finally, the last advantage of aseptic packages over PET bottles is that they are considered safe for incineration to create energy.

Material-wise, aseptic packages have advanced greatly. The paperboard used to manufacture

aseptic cartons has been reduced by 17 percent, the aluminum by 30 percent, and the LDPE layer on the inside has been reduced by 17 percent. Shape-wise, the aseptic cartons have a clear advantage over PET bottles as they are brick shaped and maximize the space in a shipping carton. Plus, the pre-assembled aseptic packages may be shipped in rolls from the package manufacturer to the product manufacturer. Aseptic packages have one other great advantage as the main material is wood. Wood is a renewable resource, when the trees come from responsibly managed forests,

as the Grand Pré package is, and wood is considered to have no carbon footprint since trees use carbon dioxide as they grow and release it when burned.



Figure 8: Artisan Wine Company Painted Turtle Wines

The Artisan Wine Company's Painted Turtle Wines is another package featured on the SPC web site as being manufactured with sustainability in mind. The unique thing about this wine bottle is that it is manufactured Ball Corporation as a PET bottle. The PET bottle has some distinctive advantages over glass. The most obvious of which being weight. A case of glass weighs 16 kilograms while a case of PET weighs just 10.1 kilograms. Other advantages over glass are not as obvious. PET requires 93 percent less energy to manufacture, produces 54 percent less greenhouse gasses, and

generates 18 percent less waste water.

Ball corporation has made advancements to the already present benefits of PET. They manufacture their bottle with sig plasmaz, a transparent, internal silicon barrier coating technology that protects the wine as well as being easily removed for recycling. In the plastics recycling realm, PET has the honor of having the greatest infrastructure for recycling. This means that it may be easily recycled and is popular for the creation of fabrics, carpets, and car parts.

Expert Review

Biodegradable seems like it should be a really good thing. After all, everything in nature biodegrades. However, Anne Johnson the director of the Sustainable Packaging Coalition, disagrees. She believes that consumers think something biodegradable will simply disappear. Unfortunately Johnson does not see the benefit of taking a non-renewable resource and adding it to a landfill to

biodegrade. She also notes one of the biggest misconceptions of landfills: that trash decomposes in them. Landfills are designed with many liners to prevent leaching and actually end up acting like tombs and preserving waste, not biodegrading it. Waste that does biodegrade will produce methane gas which has 23 times more greenhouse gas potency than carbon dioxide. Johnson believes that much more of the 90 percent of fossil-fuel-based plastic packaging currently going into landfills needs to be collected and recovered (Johnson 2008).

The fact that there is so much packaging material going to landfills is the great tragedy of packaging. We know, however, that paper, not plastics, take up the greatest volume in landfills, and paper is already biodegradable! While the biodegradable idea is fairly new, it was one of the issues raised in Susan E. M. Selke, Ph.D.'s book: "Packaging and the Environment." This is interesting as the book was published in 1990. While it would seem that nearly 20 years later, the topics she discusses in her book would be out of date, the issues remain largely the same.

Selke, as Johnson, emphasizes that the big problem with packaging is its impact on solid waste management of which there are three major ways to manage. First, and most obviously, is landfills, but this cannot be the answer according to Selke. The second option is still having trouble taking off; as many people still do not recycle. The recycle option also includes recycling energy. This basically means retrieving the energy lost from creating the packages by burning them, creating steam, and using that to create power. The idea of incinerating much of our waste is not appealing to many people, but it is a viable way of retrieving much of the energy used to manufacture products and packaging. The third method of solid waste reduction is the one that, by far, has made the most progress. The reduction of materials has had a huge impact on the mass of items going into landfills. While this has been pushed as an economic factor, the environmental savings are great (Selke 61).

In 1990, as well as now, saving money has always been one of the biggest factors in why changes happen. Saving energy is another important environmental issue that has been spurred on by rising costs. With that in mind — Selke discussed which types of packaging had the least amount of energy impact. She points out first and foremost that plastics actually have great energy savings, despite the idea that since they come from oil and/or natural gas and therefore consume more energy. In fact, plastics are easy to process and light to ship making them a deal when it comes to conserving energy. Also, when burned, plastics release a large amount of energy which

can be retrieved.

In a comparison of other material's energy consumption, Selke refers to a study performed by Gaines and sponsored by the United State Department of Energy. Follows is the results of the study as presented by Selke on page 24 of her book:

“Plastic was found to generally require less energy to product than equivalent paper products, though the paper was found to actually use more oil and natural gas than manufacturing paper from wood. Refillable glass bottles had by fat the lowest energy requirement for single service beverages, though recycled aluminum cans used less energy than recycled glass bottles. In family-size beverages, polyester plastic bottles used less energy than glass bottles unless the glass bottles were refillables that were refilled a number of times.”

At the end of her book, Selke makes some recommendations about what she thinks should be done to make packaging environmentally friendly. Foremost she mentions that all toxic components of packaging need to be removed. Then she stresses the importance of using reusable packages as they help with waste reduction and energy savings. When reusable is an option, recycling must be viable. In order to help the recycling cause, Selke suggests that as many packages be made from the same material as possible. This would help consumers to know what and how to recycle as well as eliminate costly steps in the recycling process. If one material can not be used, Selke notes that a material which is easy to separate offers the same recycling potential. Since nothing can be done with recycled materials if there is no market for it, Selke stresses the importance of using recycled materials whenever possible (Selke 171).

Between the two sources some very clear ideas of what it takes to be a green package, according to experts, is formed. Now, what are we doing to go in that direction?

Conclusions

Everything is a matter of perspective. The more research that was performed, the fewer number of answers about the environment that were black and white. One step in energy savings sacrifices solid waste management and vice versa. It is a never ending battle of chasing — like that of the recycle symbol

It was very surprising how few consumers even knew what that symbol meant, much less knew what sustainability meant. Five people out of 148 provided a clear and correct definition of sustainability. What is of a greater concern is that most of the survey participants were between the ages of 18-25. This is the future generation that be responsible for changes to come. It was interesting to see that some of the perceptions of this future generation were in fact the same as their parents. For example, aerosol spray cans used to be manufactured with CFC's and had a bad reputation. Currently, aerosol spray cans are not manufactured with CFC's and are just as recyclable, if not more so, than the plastic pump bottle, yet the majority of survey participants listed the plastic pump bottle as being more environmentally friendly.

With effort, the plastic type bottles can be very sustainable as can be seen with Aveda's product. They have created a system which is a closed loop requiring very little virgin material or input. This should really begin to be manufacturer's goal as this is almost purely the definition of sustainability. However, when materials are reused so efficiently there is no chance for energy retrieval.

One of the great banes of packaging is the multi layered package. It is debatable that making one layer out of paper or PLA (those are both renewable and biodegradable), is really going to prove to be a boon to a package as there is no way of separating that layer to recycle or degrade that layer. When it comes down to solid waste the shiny lays bag is probably the least dense and takes up less space in a landfill. However, as can be seen by the survey results, most consumers pick the bag that appears to be made of paper although it has just as many disadvantages as the bag made from plastic. If manufacturer's can create a pillow pouch bag which is made from 100 percent renewable resources and is 100 percent biodegradable and does not require more energy to manufacture, then at that point there would be an obvious winner. Currently, however, consumers just

see paper and think “good for the environment.”

That very same idea may be seen with the plastic orange bottle versus the paper orange juice bottle. While aseptic packages may offer the great advantage of not needing refrigeration therefore saving energy, the fact is that when you go to a grocery store, many shelf stable packages are kept in the refrigerated section.

Even items which are obviously shelf stable are often found in the refrigerated section as can be seen with many sodas. Glass and aluminum bottles really are seen by consumers as being the most environmentally friendly over plastic bottles. However, the plastic bottle has many advantages as well. Consumers simply perceive these as being more environmentally friendly due to their image as being easily recycled.

When all the data from the survey is analyzed, it is clear that the consumer is not as informed as previously thought. They base their purchases on what companies they know and how a package looks before even considering the environmental impact of their purchase. That in mind, package manufacturers really need to do a good job in picking the process and the materials which are best for the environment. With the packages that are winning awards, it can be seen that many are making leaps and bounds in the right direction, considering more than just materials and not attempting to advertise any more than exactly what they are offering.

More changes still need to be made before we can consider our packages sustainable. The most energy and material efficient packaging has gone the way of the milkman. More collection and full circle recycling needs to occur. Incineration is a great source of energy — but it too consumes resources so can not be seen as the answer. While the answer to sustainability is hardly clear, manufacturers are making steps in the right direction, admirably lead by themselves and having little to do with simply pleasing the whims of the uninformed consumer and are taking the advice of experts who have done research in the area of sustainability. There is a lot of hope for the future that we may be able to still allow future generations to meet their needs without compromising ours.

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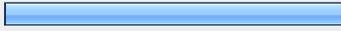
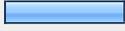
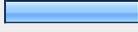
Appendix

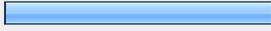
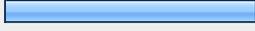
Results from Survey Monkey

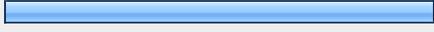
Package Design Leslie's Senior Project

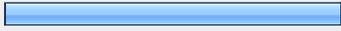
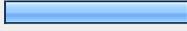
1. Age?			Response Percent	Response Count
Younger than 18		1.4%	3	
18-25		69.1%	152	
25-35		10.9%	24	
35-45		11.8%	26	
45-55		5.5%	12	
55 or older		1.4%	3	
			<i>answered question</i>	220
			<i>skipped question</i>	1

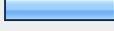
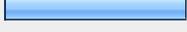
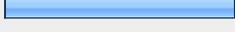
2. Gender?			Response Percent	Response Count
Male		29.5%	64	
Female		70.5%	153	
			<i>answered question</i>	217
			<i>skipped question</i>	4

3. Occupation?			Response Percent	Response Count
Student			65.3%	143
Part-time employee			22.8%	50
Full-time employee			25.6%	56
Unemployed/retired			7.3%	16
			<i>answered question</i>	219
			<i>skipped question</i>	2

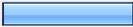
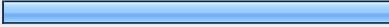
4. Which product would you rather purchase?			Response Percent	Response Count
Product A			51.5%	101
Product B			48.5%	95
			<i>answered question</i>	196
			<i>skipped question</i>	25

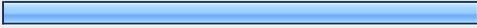
5. Which product would you rather purchase?			Response Percent	Response Count
Product C			17.1%	33
Product D			82.9%	160
			<i>answered question</i>	193
			<i>skipped question</i>	28

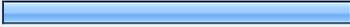
6. Which product would you rather purchase?			
		Response Percent	Response Count
Product E		64.8%	127
Product F		35.2%	69
<i>answered question</i>			196
<i>skipped question</i>			25

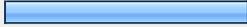
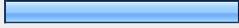
7. Which product would you rather purchase?			
		Response Percent	Response Count
Product G		20.9%	41
Product H		34.7%	68
Product I		44.4%	87
<i>answered question</i>			196
<i>skipped question</i>			25

8. Prioritize what you considered as you picked which product you would rather buy					
	Most important to me		Least important to me	Rating Average	Response Count
Familiarity with brand	76.6% (144)	10.1% (19)	13.3% (25)	1.37	188
Graphic design of package	12.0% (22)	52.2% (96)	35.9% (66)	2.24	184
Materials used to create package	12.5% (24)	38.0% (73)	49.5% (95)	2.37	192
<i>answered question</i>					196
<i>skipped question</i>					25

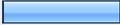
9. Which package do you consider most environmentally friendly?			
		Response Percent	Response Count
Package A		24.9%	48
Package B		75.1%	145
<i>answered question</i>			193
<i>skipped question</i>			28

10. Which package do you consider more environmentally friendly?			
		Response Percent	Response Count
Package C		7.9%	15
Package D		92.1%	176
<i>answered question</i>			191
<i>skipped question</i>			30

11. Which package do you consider more environmentally friendly?			
		Response Percent	Response Count
Product E		32.6%	63
Product F		67.4%	130
<i>answered question</i>			193
<i>skipped question</i>			28

12. Which package do you consider most environmentally friendly?			Response Percent	Response Count
Package G			8.3%	16
Package H			46.6%	90
Package I			45.1%	87
<i>answered question</i>				193
<i>skipped question</i>				28

13. What did you consider the most important factor when deciding what packages were the most environmentally friendly?						
	Most Important Factor			Least Important Factor	Rating Average	Response Count
Materials used	89.9% (169)	9.0% (17)	1.1% (2)	0.0% (0)	1.11	188
Size of package	2.3% (4)	27.6% (48)	53.4% (93)	16.7% (29)	2.84	174
Shape of package	0.0% (0)	3.7% (7)	27.7% (52)	68.6% (129)	3.65	188
Manufacturing process used to make package	8.1% (15)	60.8% (113)	18.3% (34)	12.9% (24)	2.36	186
<i>answered question</i>						194
<i>skipped question</i>						27

14. What do the above images mean to you?			
		Response Percent	Response Count
That the package is recyclable		22.4%	43
That the package is made with a specific plastic		44.8%	86
That the package is made from post consumer waste		0.5%	1
All of the above		30.7%	59
None of the above		1.6%	3
		<i>answered question</i>	192
		<i>skipped question</i>	29

15. Have you heard the term "sustainable" before?			
		Response Percent	Response Count
Yes		91.1%	175
No		8.9%	17
		<i>answered question</i>	192
		<i>skipped question</i>	29

16. If you have heard the term "sustainable," how do you define it?		
		Response Count
		148
		<i>answered question</i>
		148
		<i>skipped question</i>
		73

Word Responses to Last Survey Question

1. We can reuse the source and not run out of it or overuse it.
2. meeting today's needs without compromising the ability to meet the needs of future generations
3. A material or process that does not take away from the environment more than it puts back. Or that it is environmentally neutral.
4. Something that is possible to be continued.
5. sustainable means something that can continue to exist without depleting and/or destroying the resources it takes to create it.
6. Can be used with little or no effect on the environment
7. It means a product is from well maintained and renewable resources and with efficient energies.
8. Something that can be recycled and reused or made from recycled material.
9. giving back to the environment
10. Using resources that can be replenished within our lifetime.
11. It means to last, or endure. Like using the sun as sustainable energy... it will last or endure longer than oil.
12. using processes that are eco friendly and conserve energy to offset energy used in production
13. use the least amount of resources possible in a way that can hopefully be recycled or reused
14. something that has a small effect on the environment
15. Ensuring all processes in creating a package are good for the environment and taking full advantage of recycling so that less raw materials will be wasted.
16. green, environmentally friendly
17. used with sustainable resources
18. Be able to reuse and reduce waste to the best of ability.
19. environmentally friendly - made from renewable resources
20. least amount of waste from a process
21. a material that will last a long time and can be recycled over and over. pretty environmentally friendly
22. Sustainable means that the package is making every effort to produce a product that can be reused and recycled. Also, the manufacturing process is one that cuts down on energy inefficiencies and makes use of renewable energy when possible.
23. not affecting the future in a negative way
24. environmentally friendly objects that we use
25. helping protect the environment
26. good for the environment.
27. able to be recycled and re-used for future product, non-wasteful
28. Something that is renewable and reusable
29. environmentally friendly
30. The ability to use resources without limiting the resources of future generations
31. Practices that can continue indefinitely due to proper use and management of resources
32. responsible practices that reflect thought or consideration for future resource depletion. Something is sustainable if it can sustain itself. a circular model.
33. Sustainable refers to the use of resources such that efficiency, recycling, and minimizing environmental impact are emphasized. It typically focuses on lessening our use of new raw resources and reusing that which we have previously extracted and modified.
34. Live in such a way as to have no conceivable end (due to pollution, running out of materials, etc...)
35. Sustainable = that something can last
36. We can continue producing the product indefinitely without adverse impact to the environment.

37. able to use without depletion of resource
38. environmentally friendly
39. efficient and environmentally friendly
40. non-depleting
41. The materials and manufacturing process either are readily obtainable without being depleted or have no carbon footprint.
42. Be earth friendly
43. Using only what you need.
44. an adjective used to describe something which can be self-sufficiently maintained.
45. Sustainability is a process in which an organism or system does not expend more energy and resources than it consumes.
46. something that has durability and is eco-friendly
47. A process is sustainable if it can be continued without creation of more waste and use of more new materials.
48. Something that can maintain its own existence without any outside help.
49. The product, or any part of it, will not end up in a landfill .
50. A practice of manufacturing food and other consumables that is environmentally aware and does not deplete natural resources.
51. something that is durable
52. A manufacturing process that does not yield a negative sum in the materials used, e.g., it is self-sustaining .
53. A process (manufacturing, harvesting, etc.) that can be continued indefinitely without resource over-consumption or significant environmental impact.
54. Sustainable means that the materials are harvested from resources that can be regrown or replenished fairly quickly, without fear of depleting that resource due to overconsumption of it.
55. Buzz word for being earth conscience.
56. Ability of our environmental resources to support the existing technology & lifestyle
57. Use of process and material that is renewable and or reuseable. A process that can be maintained over a very long period of time.
58. In the packaging world, I would define it as creating a deliverable product that will not be harmful and even helpful to our environment.
59. product that is made from abundant materials that has minimal impact on limited resources.
60. Sustainability means to be working towards a more environmentally, self-sufficient way of life both through mind-set and action.
61. able to be done
62. A product or practice which does not harm the earth in its manufacture or disposal
63. Ideally local and organic but in the case of some of these products a recyclable material that will take less energy to recycle than to initially produce or is completely biodegradable or reusable in another post consumer product.
64. The ability to meet the contemporary needs without compromising future abilities to meet their own needs.
65. reusable, without contributing to waste or pollution
66. describes a process that does not produce excess or unaccounted for waste.
67. A process that can be repeated indefinitely.
68. that something can remain in use without causing much damage...
69. consuming resources at a rate at which the resource has time to be replenished before consumed again
70. that it will recycle easily
71. harvesting something so it isn't depleted, or having the ability to sustain depending on context
72. In the context of consumerism, sustainable is the ability to obtain and use products that pose the least consumption of raw or virgin material. By reusing, reducing, and recycling we are able to contribute to the sustaining of all resources, natural and otherwise, that generally have a negative impact on the state of the planet that sustains us, and all other living things...in a nutshell.
73. In reference to food or other consumables, sustainable refers to the shelf life and/or how well it can decompose "naturally".

- 74. Products made with materials that are good for the environment
- 75. using renewable materials and techniques
- 76. Low environmental impact, due to ability to recycle.
- 77. The long term feasibility of an action.
- 78. conservation
- 79. A system that will continue to be viable indefinitely because of processes (like feedbacks) that make it's components last and/or regenerate.
- 80. Using only resources that can be regrown/replaced within ones own lifetime.
- 81. An item, or process, is sustainable if it done in such a way to take into account the long-term effects. It is easier to define what is NOT sustainable. Most often in business these are products or processes that aim at instant gratification (profit) without concern for the availability of resources, pollution, contamination, or social (un)welfare that results as an outcome.
- 82. it depends on the person using the term

I'd say it's creating a full circle process that uses pre-existing processes or supplies, re creating something from those that can continue through the process. hopefully one day those processes will also be less of an impact upon the environment, unfortunately the consumer only really evaluates the end product

- 83. not depleting resources used to manufacture product- renewable resources
- 84. made out of a material that can be used over and over again and is environmentally friendly
- 85. Sustainable to me means that we can make use of our own waste to be brought back into the productive cycle in some form so that it impacts the environment in the least negative way possible.
- 86. Use of less material and ability to recycle, reduce, reuse for future generations
- 87. Keeping in existence. If something is sustained it does not go to waste but it still usable.
- 88. A technology or process that is renewable coming from a source that is static but considered infinite/recyclable (glass for example) or grows with a short lifecycle (bamboo for example)
- 89. Using resources scarcely, reusing when possible, eliminating waste
- 90. Reusing as many resources as possible. Thinking twice before you buy unnecessary goods.
- 91. As a "sustainable" item on a restaurant menu. Nothing to do with recycling though I could venture a guess as to what it is.
- 92. Environmentally Friendly
- 93. able to reform or repurpose itself without need for new materials
- 94. creating a lifestyle now that will be able to continue to the next generations without hurting the Earth.
- 95. recyclable and environmentally friendly
- 96. Being able to put back what you take or at least as little as possible
- 97. no long term effect on environment
- 98. a means of configuring civilization and human activity so that society, its members and its economies are able to meet their needs and express their greatest potential in the present, while preserving biodiversity and natural ecosystems, planning and acting for the ability to maintain these ideals in the very long term
- 99. eco-friendly?
- 100. Environmentally friendly living.
- 101. surviving politely
- 102. Reusing materials, using materials that are friendly to the environment, prolonging the use of materials
- 103. capable of being maintained at a steady level without exhausting natural resources or causing severe ecological damage
- 104. Designed to be renewable or reduce waste, or reusable in some way, not adding to the problems on Earth
- 105. Something is sustainable if it doesn't negatively impact our Earth Mother.
- 106. Environmentally friendly.
- 107. environmentally responsible manufacturing and the reuse of materials to eliminate or decrease use of virgin material

108. process of reducing waste.
109. how long you can last in space. on your own!
110. Maximizing resources and minimizing waste.
111. It is something that can be maintained and generated for generations to come. It does not deplete resources without replacing them.
112. that a products lifecycle can be continued efficiently
113. That the processes used for a product that is called "sustainable" will not continue to consume resources. That some resource will be available over a longer time period, longer than the next 5, 10, 50 years.
114. green, eco friendly
115. Sustainability (pertaining to packaging) is the ability of a product to be reusable or recyclable in a large way.
116. conserving the natural, renewable and reusable resources we have available to us and/or utilizing them in a more environmentally friendly way. conservation rather than preservation.
117. a product that can be recycled and is environmentally friendly
118. sustainable means that something can be produced or consumed and it will not make an impact on another persons ability to produce or consume that product.
119. being more environmentally friendly associated with recycling
120. Being able to used materials effectively and minimally; recycling
121. Something is sustainable when it has been or can be easily re-used.
122. to be able to recycle the products used in an environmentally friendly manner and reduce carbon footprint as much as possible
123. the least amount of waste possible.
124. Can make something more from it---more than a one time use.
125. Reusable
126. Using as little resources as possible to ensure the longevity of the planet.
127. Marketing for "we suddenly care about the environment despite the fact we never gave a shit before"
128. Something that can be reproduced or manufactured without the consumption of non-renewable resources.
129. Being green! and using materials that will prevent hurting the environment
130. no carbon footprint
131. Initiating a process that is can continue indefinitely without exhausting it's resources
132. support, or maintain, or in this context the compatibility to continue with minimal damage to the environment
133. energy efficient and conservation oriented
134. To me, sustainable gives information about the process of how a product is made and how that process is less detrimental to the environment than other methods
135. something that doesn't deplete -- it endures
136. Something that we create out of materials that are capable of being used and maintained for long term use in one way or another
137. made with materials that are not a drain on the environment.
138. able to sustain itself
139. Sustainable is a practice where energy used and created are near equal. Sustainability is using resources sparingly and creating little waste to produce an item.
140. durable, long lasting
141. A cyclic life, so it is created with whatever the end product can provide or can be made with no environmental footprint
142. materials can be used to create another product, OR creates the least amount of carbon footprint OR has the least amount of impact on the environment
143. A sustainable product is one that is either made from recycled material, is recyclable, or both (or is the result of a manufacturing process that uses less energy or fewer natural resources). The hope is that used products can then be recycled into new ones to limit the use of new raw materials.

144. creating an item or offering a service that can be rendered for the foreseeable future without entirely depleting resources.
145. A sustainable process meets the current needs while still allowing future generations to meet their needs.
146. it means that a particular product is able to keep being made with little or no long-term negative effects on the environment
147. being environmentally aware
148. sustainable; something that can be sustained (or continued). a system is sustainable when it can continue without the (constant) addition of outside resources/energy.