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Consumers' Willingness To Pay (WTP) for Environmentally Friendly Products: Premiums on Low-Priced vs. High-Priced Goods

Abstract

With increasing environmental awareness and concerns, many businesses try to reach their goals of zero environmental footprint while making their financial goals. However, what is the more efficient way of balancing both economic and environmental goals? In this research, we hope to find whether consumers: 1) are willing to pay premiums for environmentally friendly products; and 2) have higher percentages of willingness to pay for environmentally friendly, low-priced goods or environmentally friendly, high-priced goods. With our data from 84 subjects (undergraduate students from University California, San Diego), we concluded that: 1) Consumers are only willing to pay very low premiums (an extra 1-5%) for environmentally friendly products, comparing to less environmentally friendly options; and 2) Consumers have higher percentages of willingness to pay for environmentally friendly, low-priced goods, comparing to environmentally friendly, high-priced goods. We will use the terms "green" and "sustainable" interchangeably as "environmentally friendly" throughout the paper.

Introduction

How much more are consumers willing to pay for environmentally friendly products, comparing to less green, sustainable goods? How much do these percentages of willingness to pay (WTP) vary depending on product types? In other words, what types of products are consumers willing to pay higher premiums for? As more environmental concerns are raised, there is an increasing amount of research done on related topic. As most literature concluded, consumers are willing to

pay more for environmentally friendly products. However, not much research really examined the price or the extra percentages of premiums consumers are willing to pay for different types of products.

Through this research, we hope to find whether consumers have higher percentages of WTP for sustainable, low-priced goods (such as printing paper, trash bags, etc.) or sustainable, high-priced goods (such as printers, automobile, etc.), by first comparing sustainable and less sustainable products and then comparing the results of low-priced versus high-priced products. Through answering the questions and knowing the differences of the percentages of consumers' WTP between different products, the market can be more efficient and invests more on certain sustainable products. As some technologies are harder to develop than others and require higher cost, we can first determine if consumers are interested in paying premiums for the environmentally friendly version of the products and how much more are they willing to pay, i.e. a low premium or high premium.

Literature Review

From past research, it has shown that consumers have higher purchase intentions for green products and low-priced products (Wei et al.). (Prefer green and low-priced.) In their paper, Wei, Lee, Kou and Wu conducted a survey in Taiwan with a two x three (appeal type x price level) research design. There was a total of 318 participants who are considered "generation green", which means "who were born after the first Earth Day in 1970" (Wei et al. 71), ranging from 18 to 35 years old. Wei concluded that 1) "Green advertising enhances perceived quality, price fairness, and purchase intentions more than non-green advertising appeal does"; and 2) "Low pricing enhances perceived price fairness, reduces financial risk, and strengthens purchase intentions more than high pricing strategies do". However, the research was limited to only one green product (shampoo).

Furthermore, Choi and Ng's work showed that although consumers have higher purchase intentions for both green products and low-priced products, consumers do not respond favorably to low prices when given low sustainable performances. (Prefer green and low-priced, but not

necessarily low-price when not sustainable.) In their research, participants were asked to imagine a scenario in which they were shopping for floor tiles with two levels of sustainability (low vs. high) and price (low vs. high) across two sustainability domains (environmental and economic). They concluded: 1) “Consumers favor sustainability in both [environmental and economic] dimensions by giving positive evaluations of the company and purchase intent”; and 2) “Consumers do not respond favorably to low prices when they have information about firm’s poor environmental sustainability”. However, in this case too, the research was limited to only one green product (floor tiles).

Even though Wei’s and Choi’s research results are insightful, I hope to examine more than one type of green products in my research in order to account for the different behaviors of consumers for different goods. As exemplified by Erik Olson’s conclusion, although consumers have higher purchase intentions for both green products and low-priced products, consumers do not respond favorably to low prices when given low sustainable performances and would lower their purchase intensions when the green products have attribute tradeoffs . (Prefer green and low-priced, but not necessarily low-price when not sustainable and not green when there are attribute tradeoffs.) He examined two types of products: car and TV. Used real world choice sets, i.e. “same brand to eliminate brand, quality, warranty, styling, and other non-technology related product variations” and concluded “strong preferences for green products are found when tradeoffs are not apparent, but preference shifts significantly to less green compromise alternatives when the actual attribute tradeoffs are considered.” In other words, consumers strongly prefer green products only if the products’ features, lifespan, quality, etc. are the same as the competitive products.

Therefore, I would look into eight products: trash bag, paper, cartridge, printer/fax, single use camera, digital camera, tire, and automobile/car. This could better improve the market’s efficiency, i.e. whether sellers should focus on developing sustainable low-priced products or sustainable high end products. My research model would be based on Essoussi and Linton’s work, *New or recycled products: how much are consumers willing to pay?*. They surveyed 49 graduate students and examined 7 products (paper, single use camera, cartridge, tire, auto part, cell phone, and printer/fax) by first comparing recycled products to brand new products and then

comparing between each products. They concluded recycled products have different values compared to new products and consumers' WTP are product specific, which depends on the level of functional risk. If there is a higher functional risk for the recycled products, consumers have lower WTP for the recycled products and prefer to purchase brand new products. For example, the participants are more willing to purchase recycled paper (low functional risk) compared to refurbished printer/fax (high functional risk). I'm going to use the same model but focus on a different factor, i.e. I would first compare consumers' WTP for sustainable vs. less green products and then compare the results between products. In this literature, they mainly focused on the effect of functional risk. Although they concluded consumers' WTP depends on risk and are product specific, they did not really demonstrate how much different do the percentages of WTP vary between products, which is what I'm interested in.

I also would like to examine the relationship between how personal income or economic status influences persona choice. In *Consumers' willingness to pay for green initiatives of the hotel industry*, Kang, et al. found a negative relationship between personal income and willingness to pay for a premium for green initiatives. Also, in *Demand for Environmental Goods: Evidence from Voting Patterns on California Initiatives*, Kahn, et al. found the environment as a normal good for people with mean incomes and an inferior good for those with high incomes. Their explanation is those with high incomes are more likely to be to afford their own gardens, and thus, are not willing to spend more on public parks. On the other hand, those with average incomes would like to spend more on the environment, since, for example, they couldn't afford their own parks. I found these results interesting and would like to investigate the decisions of different demographics. However, I need to consider the fact that my survey participants would most likely be UCSD students.

In my research, I would focus on answering how much are consumers willing to pay for different green products and if the market should focus on developing sustainable low-priced products or sustainable high end products. However, price and types of products are not the only factors that affect the consumers' decisions. Product labeling and company images are how consumers perceive the value and sustainability of the products, and thus, are important areas to discover as well.

My Model

Please see attached survey.

1) Compare consumers' choices: Company A vs. Company B

2) Compare consumers' choices: Original vs. Sustainable

These are only to differentiate whether subjects read the questions thoroughly or not. If a subject reads the questions carefully, it is very unlikely for him or her to choose Original in Part Two of the survey.

3) Compare consumers' WTP for different goods:

Let *i* be the alternatives of WTP% and y_{ij} be the choice (a dummy variable) that customer *j* (or individual in survey) makes. $0 is omitted.

LL = 1-5% L = 6-10% M = 11-15% H = 16-20% HH = >20%

$$y_{ij} = \beta_1*Price_i + \beta_2*LL_{ij} + \beta_3*L_{ij} + \beta_4*M_{ij} + \beta_5*H_{ij} + \beta_6*HH_{ij}$$

I use conditional logit to see the individual preferences of the alternatives of premiums (or WTP%).

My hypothesis: When comparing sustainable low-priced goods vs. sustainable high-priced goods, consumers would have a higher WTP for sustainable low-priced goods because consumers prefer to pay less, i.e. lower price.

I also want to look into how gender (binary) and economic status (rank 1-5) have effects on individuals' choices of the alternatives.

$$y_{ij} = \beta_1*Price_i + \beta_2*LL_{ij} + \beta_3*L_{ij} + \beta_4*M_{ij} + \beta_5*H_{ij} + \beta_6*HH_{ij} + \beta_7*LL_{ij}*Gender_j + \beta_8*L_{ij}*Gender_j + \beta_9*M_{ij}*Gender_j + \beta_{10}*H_{ij}*Gender_j + \beta_{11}*HH_{ij}*Gender_j$$

$$y_{ij} = \beta_1*Price_i + \beta_2*LL_{ij} + \beta_3*L_{ij} + \beta_4*M_{ij} + \beta_5*H_{ij} + \beta_6*HH_{ij} + \beta_7*LL_{ij}*Class_j + \beta_8*L_{ij}*Class_j + \beta_9*M_{ij}*Class_j + \beta_{10}*H_{ij}*Class_j + \beta_{11}*HH_{ij}*Class_j$$

Data (collected on Feb 1, 2016)

After excluding those survey participants whom chose Original in Part Two of the survey, I have data of a total of 84 subjects.

$$y_{ij} = \beta_1*Price_i + \beta_2*LL_{ij} + \beta_3*L_{ij} + \beta_4*M_{ij} + \beta_5*H_{ij} + \beta_6*HH_{ij}$$

YCHOICE	**ALL**	**ALL**	**LOW**	**LOW**	**HIGH**	**HIGH**
Price	-.0005938***	-.000206*	-.4096351***	-.2886817***	-.0005912***	-.0001294
	(.0000932)	(.0001181)	(.0457042)	(.097211)	(0.0000929)	(.0001249)
LL		.6621006***		1.094832***		.4233556***
		(.1073811)		(.1734856)		(.145342)
L		.1978082		.8586507***		-.0342786
		(.12097)		(.2297074)		(.170088)
M		-.4854993***		.3444156		-.6697314***
		(.148043)		(.3023873)		(.2131811)
H		-1.919888***		-.7136977*		-2.333231***
		(.2551001)		(.4298924)		(.4074958)
HH		-1.703279***		-.2819828		-2.174157***
		(.2353424)		(.4413107)		(.3899835)

Results

As my hypothesis stated, price is negative.

Consumers are only willing to pay very low premiums (an extra 1-5%) for environmentally friendly products, comparing to less environmentally friendly options.

LL is the most positive value of all. In general, consumers are willing to pay a really low premium.

Consumers have higher percentages of willingness to pay for environmentally friendly, low-priced goods, comparing to environmentally friendly, high-priced goods.
Coefficients of LL>L>M>H.

The reason why HH is less negative than H could be due to the difference between consumable goods vs. durable goods.
When comparing sustainable consumable goods vs. sustainable durable goods, consumers would have a higher WTP for sustainable durable goods. Consumers prefer their extra payments to the products last longer. For example, one may not willing to invest more on a piece of paper since it's gone after one use; on the other hand, one may invest more on a printer since it's going to last a few years. (Consumable goods are usually priced lower compared to durable goods.)

The results of gender and economic status are insignificant and therefore, could not conclude anything based on subjects' backgrounds. Reasons could due limited resources and only 84 UCSD undergraduates as subjects

Conclusions

For a better environment and better world, we need to look more into how to develop friendly, sustainable products with lower costs. According to Ray Anderson, by changing to a sustainable business model, his company's profits increased because the cost of production decreased significantly simply by recycling and reusing their old products into new products. Many more successful examples are given in Michael Braungart and William McDonough's article. However, many businesses are reluctant to change because of the fear of risking its current success. Through this survey, I hope to comfort and answer the question of the business industry by examining what types of products consumers are willing to pay more for. With this information, the market can be more efficient in producing or investing in new technologies.

Although my research's significance is limited since participants of this survey are only limited to UCSD students, we could conclude that 1) Consumers are only willing to pay very low premiums (an extra 1-5%) for environmentally friendly products, comparing to less

environmentally friendly options; and 2) Consumers have higher percentages of willingness to pay for environmentally friendly, low-priced goods, comparing to environmentally friendly, high-priced goods. We will use the terms “green” and “sustainable” interchangeably as “environmentally friendly” throughout the paper.

Participant Instructions

This questionnaire is a study of consumer purchase preferences. All of your answers are completely anonymous. You may begin as soon as you have finished reading these instructions.

***Each question is unrelated to the other questions, so treat each question as individual cases.**

****If you feel uncomfortable answering any of the questions, please leave them blank.**

You will be given 10 minutes to complete all of the questions. If you finish early, please sit quietly and wait until the end of the allotted time.

If you have a question at any time, please raise your hand and wait for the instructor to come and see you.

1. Your Age: _____

2. Your Gender: *(Please Circle)*

   Male. Female.

3. Your Major: _____

4. Are you financially dependent or independent? *(Please Circle)*

   Dependent. Independent.

5. (If you don't remember or don't know, please leave blank.)

If financially dependent, what is your parents' (or head of households) annual income?	If financially independent, what is your annual income?
_____ USD/year	_____ USD/year

6. How would you describe your (family's) economic status? *(Please Circle)*

Lower-class		Middle-class		Upper-class
1	2	3	4	5

- Company A and Company B are selling the following products for the **same price**.
- Company B is known for zero environmental footprint. In other words, **Company B's products never end up in the landfill** and are biodegradable or recycled/reused into new products/materials.

You would purchase: ***(Please Circle)***

7. Trash bags	from	**Company A**	**Company B**
8. Printer paper	from	**Company A**	**Company B**
9. Ink cartridges	from	**Company A**	**Company B**
10. Printers	from	**Company A**	**Company B**
11. Single use cameras	from	**Company A**	**Company B**
12. Digital cameras	from	**Company A**	**Company B**
13. Tire	from	**Company A**	**Company B**
14. Automobile/Car	from	**Company A**	**Company B**

Company C sells two versions of the same type of product.

- Original version of the product is produced in their original factories.
- Sustainable version of the product is produced in their new, zero footprint factories. In other words, the **sustainable version of the product never ends up in the landfill** and are biodegradable or recycled/reused into new products/materials.
- Company C is selling both versions of the products for the **same price**.

******Assume both versions **have same features, lifespan, quality, etc.** The only difference between the products is how they were produced.

You would purchase: ***(Please Circle)***

15. Trash bags	**Original**	**Sustainable**
16. Printer paper	**Original**	**Sustainable**
17. Ink cartridges	**Original**	**Sustainable**
18. Printers	**Original**	**Sustainable**
19. Single use cameras	**Original**	**Sustainable**
20. Digital cameras	**Original**	**Sustainable**
21. Tire	**Original**	**Sustainable**
22. Automobile/Car	**Original**	**Sustainable**

Assume the products compared are produced by your favorite brand (i.e. the same company/manufacturer) and **have same features, lifespan, quality, etc. The only difference between the products compared is how they were produced.

Question:

- You would be willing to **pay _____ more** for an environmentally sustainable version of this product. *(Please Circle)*
  - Please choose N/A if you have never used the specified product and expect not to in the near future.

23. Trash bags

(average price of a package of trash bags with 13 gallon, 90 count is around $15)

0%	1-5%	6-10%	11-15%	16-20%	>20%	N/A
$0	$0.2-0.8	$0.9-1.5	$1.7-2.3	$2.4-3.0	>$3.0	

24. Printer paper

(average price of a package of 500 sheet, 8.5" x 11" printer paper is around $7)

0%	1-5%	6-10%	11-15%	16-20%	>20%	N/A
$0	$0.1-0.4	$0.4-0.7	$0.8-1.1	$1.1-1.4	>$1.4	

25. Ink cartridges

(average price of a 2-pack, black/tri-color ink cartridges is around $37)

0%	1-5%	6-10%	11-15%	16-20%	>20%	N/A
$0	$0.4-1.9	$2.2-3.7	$4.1-5.6	$5.9-7.4	>$7.4	

26. Printers

(average price of an All-in-One Printer/Copier/Scanner is around $100)

0%	1-5%	6-10%	11-15%	16-20%	>20%	N/A
$0	$1-5	$6-10	$11-15	$16-20	>$20	

27. Single use cameras

(average price of a 35mm single use camera is around $11)

0%	**1-5%**	**6-10%**	**11-15%**	**16-20%**	**>20%**	**N/A**
$0	$0.1-0.6	$0.7-1.1	$1.2-1.7	$1.8-2.2	>$2.2	

28. Digital cameras

(average price of a digital SLR camera with 18-55mm and 75-300mm lenses is around $750)

0%	**1-5%**	**6-10%**	**11-15%**	**16-20%**	**>20%**	**N/A**
$0	$8-38	$45-75	$83-113	$120-150	>$150	

29. Tire

(average price of a new tire is around $100 for an average car)

0%	**1-5%**	**6-10%**	**11-15%**	**16-20%**	**>20%**	**N/A**
$0	$1-5	$6-10	$11-15	$16-20	>$20	

30. Automobile/Car

(average transaction price of a new compact car is around $20,560)

0%	**1-5%**	**6-10%**	**11-15%**	**16-20%**	**>20%**	**N/A**
$0	$206-1,028	$1,234-2,056	$2,262-3,084	$3,290-4,112	>$4,112	

End of Survey

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