

AN ANALYSIS OF WILLINGNESS TO PAY AND REASONS FOR PURCHASING CERTIFIED FOREST
PRODUCTS

by

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Abstract

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Currently, around half a billion acres are certified around the world by the world's top three certification organizations and this number continues to grow rapidly every day. However, consumer knowledge of sustainable forest management and forest certification does not appear to be growing. This lack of consumer awareness could be the reason why there is little evidence of a price premium for certified forest products in the market. The non-existence of a price premium may discourage landowners from electing to have their forest certified as sustainably managed. In order to encourage consumers to pay more for certified forest products, it is necessary to disseminate information about the benefits of forest certification and how certified forests are managed sustainably.

This study aims to determine how much a typical household consumer knows about forest certification and whether or not they would prefer certified forest products over non-certified products. To answer these questions, 100 individuals were surveyed in Durham, North Carolina during the spring of 2014 to determine their preferences for printer paper, which is a frequently purchased forest product. The results indicated that 48% of respondents have not heard of forest certification and only 3% knew a lot about it. This demonstrates that there are great marketing opportunities for certification organizations, manufacturers of certified forest products, and certified forest product carriers (e.g. Home Depot and Staples).

In addition to surveying for knowledge about certification, respondents were given a hypothetical purchasing scenario where they were asked to either purchase a ream of certified paper or a ream of non-certified paper. The only things that varied about these types of paper was 1) the price of certified paper and 2) whether the paper was certified or not certified. 73 respondents stated that they preferred the certified paper over the non-certified paper and they would, on average, pay an additional \$2.67 for certified paper. Of the respondents who chose the non-certified paper, they indicated that the reason they selected it was because the certified paper was too expensive and that they did not know enough about how certified forest management differs from non-certified forest management.

Approved

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Introduction

Imagine you are standing in the printer paper section at an office supply store. There are three reams of paper wrapped in packaging decorated with labels indicating why one type of paper is different from the neighboring reams. One ream is comprised of 30% recycled content, another ream is characterized by its superior brightness and thickness, the last ream uses pulp sourced from a certified forest. How do you decide which paper to take home?

This is an issue that consumers are faced with when making a decision to purchase anything. The mental calculus that people do when purchasing a product involves the comparison of the available market goods all in search of the best item that we are able to afford (Golden, et al. 2010; Teisl, et al. 2008). Labels are there to assist consumers in the decision-making process by signifying aspects of that good, such as average miles per gallon on a car, processing speed for a computer, organic nature of broccoli, etc. However, in order for labels to be effective, the consumer must have an understanding of what they indicate. If the consumer understands the label and has a preference toward goods with that a label, they may be willing to pay more for that good.

This study aims to demonstrate overall household consumer's knowledge of forest certification and whether or not consumers have a preference for certified forest products. If a consumer prefers certified forest products over non-certified forest products, it is useful to also identify whether they are willing to pay a premium for certified forest products.

To address this 100 respondents were surveyed in Durham, North Carolina to determine their preferences for certified printer paper and whether or not they would be

willing to pay a premium for the certified paper. The typical respondent from this study is a female between the ages of 25 and 34 with a Bachelor's degree. The results from the surveyed found that 48% of respondents have not heard of forest certification prior to the survey and only 3% knew a lot about forest management under forest certification. When respondents were given a hypothetical purchasing scenario, 73 respondents preferred the certified paper over non-certified and, on average, respondents were willing to pay \$2.67 more for certified paper.

Literature Review

The certified forest products market in the United States is dominated by three forest certification schemes, the Sustainable Forestry Initiative (SFI), the Forest Stewardship Council (FSC) and the Programme for the Endorsement of Forest Certification (PEFC). SFI certifies 97.5 million hectares in the United States and Canada (SFI 2013), FSC certifies 181.5 million hectares internationally (FSC 2014), and PEFC certifies 233 million hectares internationally (PEFC 2014). These certification schemes all use an ecolabel that can be used to identify products that contain some percentage of certified materials.¹ As you can see from the images, forest certification ecolabels come in many different varieties and contain differing amounts of information about the program and product.

The purpose and effectiveness of ecolabeling has been the cornerstone of many studies. An ecolabel is a marketing tool used to promote the environmental friendliness of a particular product (Aguilar and Cai 2010; Aguilar and Vlosky 2007; Cha et al. 2008;

¹ Images of these labels can be found in Appendix 1

Golden et al. 2010; Tiesl et al. 2002; Teisl et al. 2008). In addition to being environmentally more friendly, economic and social sustainability tend to also be associated with eco-labels (Rametsteiner and Simula 2003; Cai and Aguilar 2013a). However, an eco-label is only as successful as the information it communicates to the consumer. According to Teisl et al. (2008), an ecolabel should communicate the eco-friendliness of the good and credibility of the certifying organization. Credibility was described by Nebel et al. (2005) as demonstrating transparency and standardization of the certification process, trustworthiness of the certifying organization (i.e. without conflicts of interest), and should be acceptable to the stakeholders (i.e. group both directly and indirectly affected by certification). More specifically to forest certification, consumers must be assured that forests are being managed in a sustainable manner (Harshaw et al. 2009).

If forests are managed in a sustainable and transparent manner, a consumer may be inclined to pay a price premium for the product. This area of forest certification has been heavily researched and there is a wide range of potential price premiums identified. Most of these studies have shown that consumers exhibit a willingness to pay premium for certified forest products (Nebel, et al. 2005; Aguilar and Vlosky 2007; Bensel, et al. 2008; Chen, et al 2010; Schreiber 2012Husted, et al. 2014). One of the most comprehensive studies was a meta-analysis done by Cai and Aguilar (2013b). The authors analyzed 59 studies from 19 authors/groups of authors. 21 of the 59 studies collected data on willingness to pay for frequently purchased wood products, e.g. paper. The average willingness to pay premium identified in the meta-analysis as 12.2% and consumers were on average willing to pay 8.1% more for frequently purchased products, e.g. paper, than the least frequently purchased good, e.g. a house (Cai and Aguilar

2013b). Some studies found that consumers were not willing to pay a premium for certified products (Anderson and Hansen 2004). Anderson and Hansen did not conduct a stated preference survey and instead monitored actual purchasing behavior of plywood at Home Depot (2003).

The product in this study that is being used to estimate willingness to pay premiums and consumer preferences is printer paper. The reason this product was selected was because it is visually homogenous (Anderson and Hansen 2003) and is arguably one of the most frequently purchased and used forest product. According to Teisl et al. (2008), consumers identify a connection between “high usage and environmental impact” of paper. Therefore, consumers may be more likely to pay a premium for certified printer paper. Additionally, the price for a ream of paper is relatively inexpensive in comparison of other wood products, which may lead to a relatively high willingness to pay premium compared to more expensive, durable goods (Aguilar and Vlosky 2007; Cha, et al. 2009; Kruger 2010). Few studies have solely analyzed the certified paper market to estimate willingness to pay premiums (Cha et al. 2009; Kruger 2010).

Survey Methodology

To test my hypotheses, I conducted a contingent valuation method (CVM) based face-to-face intercept survey². The survey was composed of three sections. First, there were questions about past purchases of printer paper and prior knowledge of forest certification. The second section involved a hypothetical scenario where the respondent

² See Appendix 2 for a copy of the survey

was asked about certified paper. “Certified” was defined based on the following characteristics or management goals.³

- ensure sustainable tree harvesting practices,
- preserve old-growth or high conservation value forests,
- protect plants and animals that also live in the forest, especially endangered species, and
- protect the water in the lakes, rivers, and streams that run through the forest.
- Additionally, the forest must be verified by a third-party organization to ensure that these management goals are being met

After reading the definition of certification, the respondent was presented with the following question:

Directions: The following two questions involve the hypothetical purchase of one ream of printer paper (500 sheets). Suppose you have the option to buy two types of printer paper. The weight, brightness, recycled content, and quality of the two types of printer paper are identical. The only difference is that one type of printer paper is certified while the other type is not certified.

Question 4: Given the option, which type of printer paper would you most likely purchase?

Non-certified paper for \$5.50

Certified paper for \$6.50⁴

As described in the directions to this question, both types of paper are identical in weight, brightness, recycled content, and quality. The only difference is that one type of paper is certified while the other type is not certified. The price of the non-certified paper was held constant at \$5.50 per ream, while the price of the certified paper varied between \$5.50 (0% premium) and \$9.00 (64% premium).

³ The definition of certification is broad and takes into account the management goals that are consistent among the three most common certification schemes, i.e. Forest Stewardship Council (FSC), Programme for Endorsement of Forest Certification (PEFC), and Sustainable Forestry Initiative (SFI).

⁴ An individual survey would have one price option for certified paper. However, the price for certified paper could be any of the following prices: \$5.50, \$6.00, \$6.50, \$7.00, \$8.00, and \$9.00

If the respondent selected the non-certified paper, they were asked to rank their agreement with the following statements on a 1 (Strongly Disagree) to 5 (Strongly Agree):

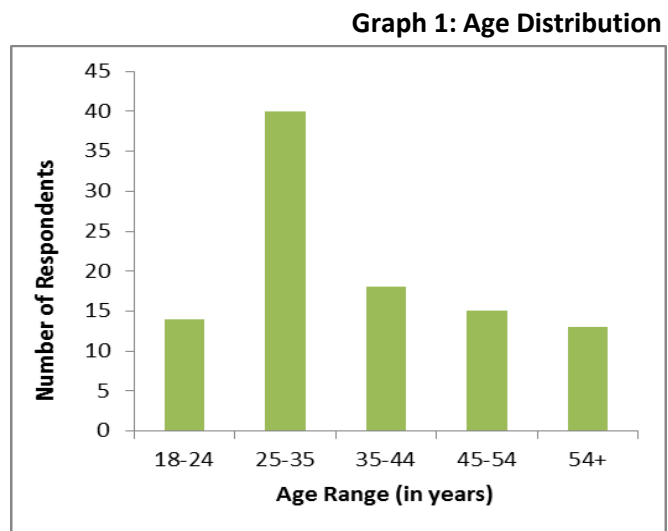
- 1) I think that non-certified forests are already properly managed
- 2) I think that there are enough laws that currently protect forests
- 3) I do not think there is effective monitoring of certified forests
- 4) I do not know enough about how certification affects current forest management
- 5) The certified paper was too expensive
- 6) Other (the respondent was asked to list other reasons in provided area)

If the respondent selected the certified paper, they were asked to skip the question about reasons and continue to the final section of the survey. The third section of the survey included questions about respondent demographics (sex, age, and education level) and a question about whether or not the respondent would be more likely to purchase certified forest products after taking the survey.

Results and Discussion

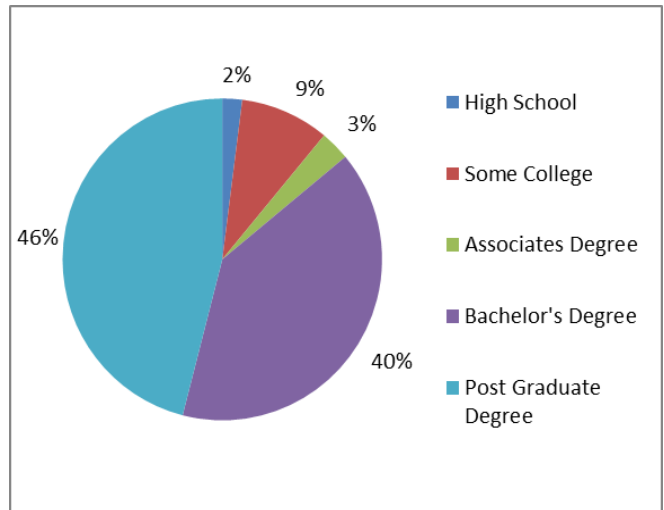
A total of one hundred surveys were collected in Durham, North Carolina during the spring of 2014. Of the one hundred surveys, females comprised 58% of the responses, 40% of the respondents were between 25 and 35 years of age (Graph 1), and 86% of the respondents had obtained at least a Bachelor's degree at the time of the survey (Graph 2).

There is an obvious skew towards younger, highly educated individuals. This could be as a result of the selected study area. Durham, North Carolina is a part of



the Research Triangle Park, which is a hub of many large technology companies, such as IBM and GlaxoSmithKline. The Research Triangle Park is also home to Duke University, North Carolina State, and University of North Carolina at Chapel Hill. The median age of Durham residents is around 30 years of age and 45% of residents have at least a bachelor's degree (U.S. Census Bureau 2010).

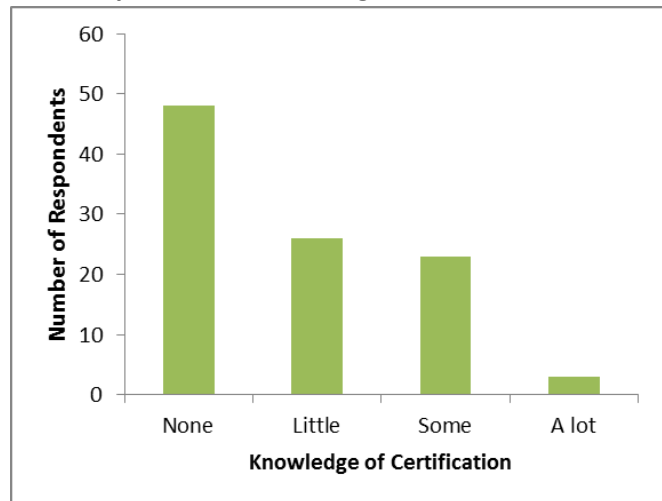
Graph 2: Level of Education



Consumer's Knowledge of forest certification and marketing of certification

Graph 3 shows that while the respondents in this study are highly educated, respondents have limited knowledge of forest certification. The lack of knowledge of certification was tested for in other studies and similar results were found (Aguilar and Cai 2010; Anderson and Hansen 2003; Chen et al. 2011; Tiesl et al. 2002). Due to the lack of knowledge of forest certification, there

Graph 3: Prior Knowledge of Forest Certification



are opportunities for certifying organizations (e.g. FSC, SFI, and PEFC), certified forest product carriers (e.g. Staples and Home Depot), and certified forest product manufacturers to inform the public of the benefits of forest certification through a marketing campaign. This marketing campaign should be aimed towards describing the

process and outlining the benefits of forest certification and how forest certification affects forest management.

In the survey, respondents who selected the non-certified paper were asked to rate their agreement to the follow five statements (results are summarized in Table 1):

- 1) I think that non-certified forests are already properly managed
- 2) I think that there are enough laws that currently protect forests
- 3) I do not think there is effective monitoring of certified forests
- 4) I do not know enough about how certification affects current forest management
- 5) The certified paper was too expensive

Table 1: Reasons for Not Selecting Certified Paper

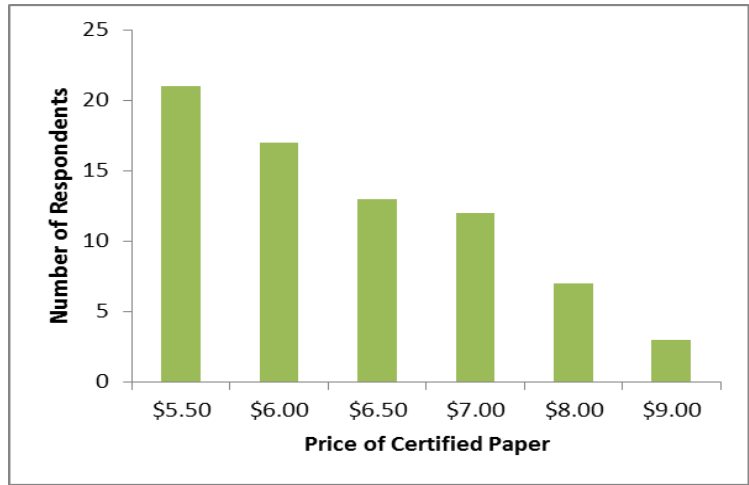
	Statement1	Statement2	Statement3	Statement4	Statement5
Strongly Disagree	11.5%	34.6%	7.7%	0.0%	3.8%
Disagree	15.4%	11.5%	0.0%	3.8%	0.0%
Neutral	69.2%	34.6%	80.8%	50.0%	23.1%
Agree	0.0%	15.4%	7.7%	30.8%	30.8%
Strongly Agree	3.8%	3.8%	3.8%	15.4%	42.3%

According to the 27 respondents who selected the non-certified paper, the second most common reason why respondents decided to purchase the non-certified paper over the certified paper was because they did not know enough about how certification affects forest management. The most common reason to not purchase certified paper was because it was too costly. A majority of respondents were indifferent about effective monitoring of certified forests. However, the United Nations Environment Programme identified proper certification monitoring as one of the largest issues of eco-labeling/certification (Rotherham 2005). Therefore, it should be a priority of the marketing campaign to demonstrate the auditing process and its effectiveness.

Respondents Willingness-to-pay Premium for Certified Forest Paper

When respondents were given the hypothetical paper purchase situation, 73 respondents selected the certified paper. Graph 4 demonstrates the inverse relationship between price of certified paper and demand. Table 2 below demonstrates how

Graph 4: Willingness to Pay for Certified Paper



willingness to purchase certified paper differs depending on sex, age, and level of education.

Table 2: Demographic Distribution of Paper Selection

Demographic Variables	Selection of Certified or Non-Certified Paper		# of Respondents
	Non-Certified	Certified	
Sex:			
Male	40.5%	59.5%	42
Female	17.2%	82.8%	58
Age:			
18-24	14.3%	85.7%	14
25-34	30.0%	70.0%	40
35-44	22.2%	77.8%	18
45-54	26.7%	73.3%	15
55-64	42.9%	57.1%	7
65-74	20.0%	80.0%	5
75+	100.0%	0.0%	1

Demographic Variables	Selection of Certified or Non-Certified Paper		# of Respondents
	Non-Certified	Certified	
Education:			
High School	0.0%	100.0%	2
Some College	37.5%	62.5%	8
Associate's Degree	50.0%	50.0%	4
Bachelor's Degree	30.0%	70.0%	40
Post Graduate Degree	21.7%	78.3%	46

These results can be used to determine whether one demographic is more likely to purchase certified paper over another. For example, women appear to be more likely to purchase certified paper compared to men. To calculate how much more likely a woman is to purchase certified paper, one would need to divide the proportional values as follows:

Equation 1:

$$\frac{Female}{Male} = \frac{(82.8\%/17.2\%)}{(59.5\%/40.5\%)} = 3.27$$

The odds ratio shows that females are 3.27 times more likely to purchase certified paper compared to males. However, it is necessary to test whether or not these ratios show a statistically significant difference between the two demographic groups.

To test the significance of these relationships, the following binomial logit model was used:

$$L_{CertChoice} = \beta_0 + \beta_1 CertifiedPrice + \beta_2 Knowledge + \beta_3 Sex + \beta_4 Age + \beta_5 Education + \varepsilon$$

The binomial dependent variable used in the model was CertChoice, which is whether or not the respondent selected certified paper (1=yes, 0=no). The independent variables used was price of the certified product (CertifiedPrice), prior knowledge of

certification (Knowledge) and demographic information about the respondent (Sex, Age, Education). The independent variables were coded as follows:

- 1) Certified Price: \$5.50, \$6.00, \$6.50, \$7.00, \$8.00, \$9.00
- 2) Knowledge: None (1), Little (2), Some (3), and a lot (4)
- 3) Sex: Female (1), Male (0)
- 4) Age: 18-24 (1), 25-34 (2), 35-44 (3), 45-54 (4), 55-64 (5), 65-74 (6), and 74+ (7)
- 5) Education: High School (1), Some College (2), Associate’s Degree (3), Bachelor’s Degree (4), and Post Graduate Degree (5)

The results from the model are summarized below in Table 3.

Table 3: Results from the Binomial Logit Model

Variable	Beta Coef.	Standard Error	P-value
Certified price	-.805	.220	.000
Knowledge	.150	.282	.595
Sex	1.353	.528	.010
Age	-.202	.184	.271
Level of Education	.047	.164	.771
Constant	5.772	2.073	.005

Only two variables are significant at the 90% confidence interval: 1) price of certified paper and 2) sex. The beta coefficients given by the model are the logarithmic odds. Therefore, these logarithmic odds need to be converted to the odds ratios. To convert these two variables, the following equation can be used:

Equation 2:

$$Odds\ Ratio = \frac{\exp(\beta_{constant} + \beta_{IndependentVariable})}{\exp(\beta_{constant})}$$

Using this equation, the odds ratio of the price of certified paper is .447. Meaning, with a \$1 increase in the price of certified paper, there is a .44 decrease in the likelihood that a person will select certified paper. The odds ratio of sex is 3.869. Meaning, women are

3.869 times more likely to purchase certified paper compared to males. This is comparable to the value found above in equation 1.

In order to calculate the willingness to pay, a simple logit model was run that regressed the dependent variable (certchoice) on the difference in price between certified and non-certified paper (PriceDiff). The results are summarized in Table 4.

Table 4: Results from Simple Binomial Logit Model

Variable	Beta Coef.	Standard Error	P-value
PriceDiff	-.709	.228	.002
Constant	1.895	.393	.000

To determine the mean willingness-to-pay, the “wtpcikr” command was run on PriceDiff. The results of this indicate that the average willingness-to-pay premium is \$2.67 for the certified paper and is statistically significant at the 99% confidence interval. The results are summarized below in Table 5.

Table 5: Results from wtpcikr model

	WTP	Lower Bound	Upper Bound	P-value
Mean/Median	2.67	1.92	5.15	.0010

While these results are statistically significant, the average willingness to pay premium is much higher than other studies and indicate that there is promise for the potential for a price premium. Caution must be used due to the skewed respondent demographic distribution. However, there is data to support the hypothesis that household consumers typically do not know or understand forest certification. It is important that information about forest certification be shared to educate consumers about the options available.

Conclusion

The amount of certified forest land is growing every day. However, consumer knowledge of sustainable forest management does not appear to be growing at the same rate. Additionally, there is little evidence to support the presence of a price premium for certified goods that are sold at product outlets like Home Depot or Staples. To encourage consumers to pay marginally more for certified forest products, it is necessary to disseminate information about the benefits of forest certification and how certified forests are managed sustainably.

The 100 consumers surveyed in this study indicated that they are generally unaware of the concept of forest certification. However, by providing a short definition of sustainable forest management and forest certification in this survey, 73% of respondents preferred certified printer paper over non-certified paper in a hypothetical paper purchasing scenario. Respondents also indicated that they would be willing to pay a premium of 12.2%, on average, for certified paper.

Bibliography

- Aguilar F.X., Cai, Z., 2010. Conjoint effect of environmental labeling, disclosure of forest of origin and price on consumer preferences for wood products in the US and UK. *Ecological Economics* 70, 308-316.
- Aguilar F.X., Vlosky R.P., 2007. Consumer willingness to pay price premiums for environmental certified wood products in the US. *Forest Policy and Economics* 9.1100-1112.
- Anderson, R.C., Hansen E.N., 2003. An Analysis of Consumer Response to Environmentally certified Ecolabeled Forest Products. Oregon State University, PhD Dissertation, 1-150.
- Anderson R.C., Hansen E.N., 2004. Determining Consumer Preferences for Ecolabeled Forest Products: An Experimental Approach. *Journal of Forestry*, 28-32.
- Araujo, M., Kant, S., Couto, L., 2009. Why Brazilian companies are certifying their forests? *Forest Policy and Economics* 11, 579-585.
- Bensel, T., Newsom, D., Bahn, V., 2008. Are There Economic Benefits from Forest Stewardship Council (FSC) Certification? An Analysis of Pennsylvania State Forest Timber Sales. Rainforest Alliance, 1-13.
- Cai, Z., Aguilar, F.X., 2013a. Consumer stated purchasing preferences and corporate social responsibility in the wood products industry: A conjoint analysis in the U.S. and China. *Ecological Economics* 95, 118-127.
- Cai, Z., Aguilar, F.X., 2013b. Meta-analysis of consumer's willingness-to-pay premiums for certified wood products. *Journal of Forest Economics* 19, 15-31.
- Cashore, B., Auld, G., Newsom, D., 2003. Forest certification (eco-labeling) programs and their policy-making authority: explaining divergence among North American and European case studies. *Forest Policy and Economics* 5, 225-247.
- Cha, J., Chun, J., Yeo-Chang, Y., 2009. Consumer Willingness to Pay Price Premium for Certified Wood Products in South Korea. *Journal of Korean Forest Science* 98, 203-211.
- Chen, J., Innes, J.L., Kozak R.A., 2011. An exploratory assessment of the attitudes of Chinese wood products manufacturers towards forest certification. *Journal of Environmental Management* 92, 2984-2992.
- Chen, J., Innes, J.L., Tikina, A., 2010. Private cost-benefits of voluntary forest product certification. *International Forestry Review* 12(1), 1-12.

- Creamer, S.F., Blatner, K.A., Butler, B.J., 2012. Certification of family forests: What influences owners' awareness and participation? *Journal of Forest Economics* 18, 131-144.
- Cubbage F., Moore, S., Henderson, T., Araujo M.F.C., 2009. Costs and Benefits of Forest Certification in the Americas. *Natural Resources*, 155-183.
- Elliott, C., Schlaepfer, R., 2001. Understanding forest certification using the Advocacy Coalition Framework. *Forest Policy and Economics* 2, 257-266.
- Forest Stewardship Council, 2014. Global FSC certificates: type and distribution. 1-18. Retrieved from <https://ic.fsc.org/facts-figures.19.htm>
- Golden, J.S., et al., 2010. An Overview of Ecolabels and Sustainability Certifications in the Global Marketplace. Nicholas Institute for Environmental Policy Solutions, Duke University, 1-99.
- Hansen, R.C., 2003. An Analysis of Consumer Response to Environmentally Certified, Ecolabeled Forest Products. Dissertation at Oregon State University. 1-150.
- Harshaw, H.W., Sheppard, S.R.J., Jeakins, P., 2009. Public attitudes toward sustainable forest management: Opinions from forest-dependent communities in British Columbia. *BC Journal of Ecosystems and Management* 10(2), 81-103.
- Husted, B.W., Russo, M.V., Basurto Meza, C.E., Tilleman, S.G., 2014. An exploratory study of environmental attitudes and the willingness to pay for environmental certification in Mexico. *Journal of Business Research* 67, 891-899.
- Isaev, N., Clark, M.R., Davidson, D.J., 2010. Assessing Opportunities and Constraints in Campus Sustainability: The Role of Paper Consumption. *Sustainability* 3(3), 171-177.
- Jensen, K.L., Jakus, P.M., 2003. Consumers' Willingness to Pay for Eco-Certified Wood Products. Presentation at American Agricultural Economics Association Annual Meeting. 1-20.
- Jensen, K., Jakus, P., English, B., Menard, J., 2002. Willingness to Pay for Environmentally Certified Hardwood Products by Tennessee Consumers. *Agricultural Economics* 1, 1-21.
- Johansson, J., Lidestav, G., 2011. Can voluntary standards regulate forestry? – Assessing the environmental impacts of forest certification in Sweden. *Forest Policy and Economics* 13, 191-198.
- Kilgore, M.A., Leahy, J.E., Hibbard, C.M., Donnay, J.S., 2006. Assessing Family Forestland Certification Opportunities: A Minnesota Case Study. *Journal of Forestry*, 27-33.

- Klooster, D., 2005. Environmental certification of forests: The evolution of environmental governance in a commodity network. *Journal of Rural Studies* 21, 403-417.
- Kraxner, F., Yang, J., Yamagata, Y., 2009. Attitudes towards forest, biomass and certification – A case study approach to integrate public opinion in Japan. *Bioresource Technology* 100, 4058-4061.
- Kruger, C.R., 2010. Public Preferences for SFM: Case Studies in Tenure Policy and Forest Certification. Master's Thesis, University of Alberta, 1-132.
- Mason, C.F., 2013. The Economics of Eco-Labeling: Theory and Empirical Implications. UC Center for Energy and Environmental Economics Working Paper, 1-44.
- McDermott, C.L., 2012. Trust, legitimacy and power in forest certification: A case study of the FSC in British Columbia. *Geoforum* 43, 634-644.
- Moore, S.E., Cabbage F., Eicheldinger C., Impacts of Forest Stewardship Council (FSC) and Sustainable Forestry Initiative (SFI) Forest Certification in North America. *Journal of Forestry*, 79-88.
- Murray, B.C., Abt, R.C., 2001. Estimating price compensation requirements for eco-certified forestry. *Ecological Economics* 36, 149-163.
- Nebel, G., Quevedo, L., Jacobson, J.B., Helles, F., 2005. Development and economic significance of forest certification: the case of FSC in Bolivia. *Forest Policy and Economics* 7, 175-186.
- Newsom, D., Bahn, V., Cashore, B., 2006. Does forest certification matter? An analysis of operation-level changes required during the SmartWood certification process in the United States. *Forest Policy and Economics* 9, 197-208.
- Overdevest, C., Rickenbach, M.G., 2005. Forest certification and institutional governance: An empirical study of Forest Stewardship Council certificate holders in the United States. *Forest Policy and Economics* 9, 93-102.
- Owari, T., Juslin, H., Rummakainen, A., Yoshimura, T., 2006. Strategies, functions and benefits of forest certification in wood products marketing: Perspectives of Finnish suppliers. *Forest Policy and Economics* 9, 380-391.
- Pappila, M., 2013. Forest certification and trust – Different roles in different environments. *Forest Policy and Economics* 31, 37-43.
- Perera, P., Vlosky, R.P., Dunn, M.A., Hughes, G., 2008. U.S. home-center retailer attitudes, perceptions and behaviors regarding forest certification. *Forest Products Journal* 58(3), 21-25.

- Programme for the Endorsement of Forest Certification, 2014. About PEFC. Webpage. Retrieved from: <http://www.pefccanada.org/about.htm>
- Rametsteiner, E., Simula, M., 2003. Forest Certification – an instrument to promote sustainable forest management? *Journal of Environmental Management* 67, 87-98.
- Rotherham T. 2005. The Trade and Environmental Effects of Ecolabels: Assessment and Response. United Nations Environmental Programme, 1-44.
- Schlyter, P., Stjernquist, I., Backstrand, K., 2009. Not seeing the forest for the trees? The environmental effectiveness of forest certification in Sweden. *Forest Policy and Economics* 11, 375-382.
- Schreiber, J., 2012. A Cost Benefit Analysis of Forest Certification at The Forestland Group. Master's Project at the Nicholas School of the Environment, 1-72.
- Sedjo, R.A., Swallow, S.K. 2002. Voluntary Eco-Labeling and the Price Premium. *Land Economics* 78(2), 272-284.
- Skodzinski, N., 2006. Consumers Will Spend More for Publications Using Recycled Paper. *Book Business*, 20-22.
- Sustainable Forestry Initiative, 2013. Progress Report. 1-34. Retrieved from: <http://www.sfiprogram.org/files/pdf/sfi2013progressreportfinalwebspreadspdf/>
- Teisl, M.F., Peavey, S., Newman, F., Buono, J., Hermann, M., 2002. Consumer reactions to environmental labels for forest products: A preliminary look. *Forest Products Journal* 52, 44-50.
- Teisl, M.F., Rubin, J., Noblet, C.L., 2008. Non-dirty dancing? Interactions between eco-labels and consumers. *Journal of Economic Psychology* 29, 140-159.
- Tikina, A., Kozak, R., Larson, B., 2008. What factors influence obtaining forest certification in the U.S. Pacific Northwest? *Forest Policy and Economics* 10, 240-247.
- United States Census Bureau, 2010. Durham, North Carolina. Source: www.durhamnc.gov
- Van Kooten, G.C., Nelson, H.W., Vertinsky, I., 2005. Certification of sustainable forest management practices: a global perspective on why countries certify. *Forest Policy and Economics* 7, 857-867.
- Vidal, N., Kozak, R., Cohen, D., 2005. Chain of custody certification: an assessment of the North American solid wood sector. *Forest Policy and Economics* 7, 345-355.
- Ward, D.O., Clark, C.D., Jensen, J.L., Yen, S.T., Russell, C.S., 2011. Factors influencing willingness to pay for the ENERGY STAR label. *Energy Policy* 39, 1450-1458.

Appendix 1 – Images of forest certification labels

Sustainable Forestry Initiative:



Sources:

<http://www.plumcreek.com/Environment/nbspsustainableforestrySFI/nbspsFIImplementation/tabid/152/Default.aspx> and <http://www.sfiprogram.org/sfi-standard/labels-claims/>

Forest Stewardship Council:



Sources: <http://www.carboncanopy.com/about/partners/ngos/> and <http://borneoinsider.com/2013/06/12/certification-may-assure-market-access-premium-prices/>

Programme for the Endorsement of Forest Certification



Sources: http://pfbc-cbfp.org/news_en/items/PEFC_New_Member_CBFP_E.html and [http://www.ktlfloor.com/?cur=page/page&id=39&title=Wood sources and certifications](http://www.ktlfloor.com/?cur=page/page&id=39&title=Wood_sources_and_certifications)

Appendix 2 – Survey

Analysis of Household Purchasing Habits of Printer paper

Hello. I am a graduate student at Duke University and I am researching household preferences for copier paper. The results from this survey will be used to complete my master's project.

Your participation is voluntary. However, your participation is essential in the success of my research.

Thank you for taking the time to complete this survey!

Question 1: In the past twelve months, did you purchase printer paper to use in your home?

- Yes (If yes, please continue to question 2)
- No (If no, please continue to question 3)

Question 2: If you did purchase printer paper in the past 12 months, where did you purchase it?
(Select any or all that apply)

- Staples/Office Depot/Office Max
 - Target/Walmart
 - Costco/Sam's Club
 - Online retailer (for example, Amazon or Ebay)
 - FedEx Office
 - Other (please specify below):
-

Question 3: Which statement below best describes your understanding of forest certification?

- I have not heard of forest certification before
- I have heard of forest certification before but do not know anything about it
- I know a little about forest certification
- I know a lot about forest certification

For the following questions, you will be asked about certified printer paper.

In order for paper to be certified it must come from a forest that is managed to:

- ensure sustainable tree harvesting practices,
- preserve old-growth or high conservation value forests,
- protect plants and animals that also live in the forest, especially endangered species, and
- protect the water in the lakes, rivers, and streams that run through the forest.
- Also, certified forests must be verified by a third-party organization to ensure that these management goals are being met

Directions: The following two questions involve the hypothetical purchase of one ream of printer paper (500 sheets). Suppose you have the option to buy two types of printer paper. The weight, brightness, recycled content, and quality of the two types of printer paper are identical. The only difference is that one type of printer paper is certified while the other type is not certified.

Question 4: Given the option, which type of printer paper would you most likely purchase?

___ Non-certified paper for \$5.50 (Continue to question 5)

___ Certified paper for \$5.50/\$6.00/\$6.50/\$7.00/\$8.00/\$9.00 (Continue to question 6)

Question 5: If you selected the non-certified printer paper, what were your reasons for purchasing the non-certified paper? **(For each statement, circle the appropriate level of agreement)**

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I think that non-certified forests are already properly managed	1	2	3	4	5
I think that there are enough laws that currently protect forests	1	2	3	4	5
I do not think there is effective monitoring of certified forests	1	2	3	4	5
I do not know enough about how certification affects current forest management	1	2	3	4	5
The certified paper was too expensive	1	2	3	4	5
Other (Please write your reasons in this box):					

Question 6: How would you describe your preferences about purchasing certified printer paper, compared to before you did this survey?

- I am less likely to purchase certified paper
- I am more likely to purchase certified paper
- I am neither more nor less likely to purchase certified paper.

Question 7: How do you identify?

- Female
- Male
- Other

Question 8: Age:

- 18 to 24 years old
- 25 to 34 years old
- 35 to 44 years old
- 45 to 54 years old
- 55 to 64 years old
- 65 to 74 years old
- 75 years or older

Question 9: What is the highest level of education you have completed?

- Some High School
- High School/GED
- Some College
- Trade/technical/vocational training
- Associate's Degree
- Bachelor's Degree
- Post Graduate/Professional Degree