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A Research Monograph of the
Printing Industry Center at RIT

No. PICRM-2012-04

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Definitions

This paper may use some terms that can be interpreted in a variety of ways. Please review the following terms before reading further.

- **Banner Sheet** - A separator page printed with each document output that shows the document name, printed by, date and time listed in large print to show ownership of the document.
- **Default Print Settings** - The settings that are automatically used when printing a document.
- **Delayed Print** - Submitted documents do not print until the user cues it to print at the physical printer.
- **Draft Mode** - The highest-speed, lowest-quality print mode that uses less ink output.
- **Eco-font** - A font that minimizes the amount of ink used to print the text in a document.
- **Environmental / Environmentally Sustainable / Green / Sustainable** - We use these terms interchangeably to indicate a lower impact on the natural environment.
- **Minimize Margins** - Decreasing the width of the blank space above, below, and on either side of text in a document. By doing this, more text can fit on one page.
- **Print Preview** - The option to view exactly what printed page(s) will look like before they are physically printed.
- **Straggler / Orphan** - Words or lines at the beginning or end of a document that are left dangling at the top or bottom of a column or the next printed page.
- **Toner-Save Mode** - The highest-speed, lowest-quality print mode that uses less toner output.
- **Watermark** - A faded text code that is printed on a document to identify the file's owner.
- **2-Up or More** - Two or more page images per printed page.

Executive Summary

The focus of this report is to provide an overview of green print behaviors in an office setting. Using both focus group and survey data, we outline a number of findings. First, respondents indicated that printing duplex is an ideal and expected default printer setting; in fact, 49% of survey respondents use duplex printing as default. Therefore, companies should consider providing employees tools for dual screen functionality and coordinate office printers to default duplex printing.

Second, in terms of communication of green data, 61% of survey respondents were highly interested in receiving data about the dollars saved from the use of green print behaviors, which signifies that this in particular is a quantifiably strong motivation for individuals. Therefore, when print providers develop informational tools to encourage adoption of greener print behaviors, it is wise to start with financial information about savings from the use of greener behaviors. Furthermore, 47% of survey respondents prefer to have such information provided in the form of graphs and charts.

Another critical discovery is that there are different motivational factors that influence behavior change. Those employees who are motivated by achieving goals, as opposed to meeting peer expectations or a desire to help the environment, will be most likely to engage in green behaviors that are aligned with these goals. This suggests that feedback on environmental impacts of print decisions, in relation to company and personal goals, is an important factor in encouraging green print behaviors. These and other findings are discussed.

Introduction

The focus of this report is to provide an overview of green print behaviors in an office setting. To successfully encourage sustainable behaviors by workplace print consumers, print providers and employers must first understand the motivations that drive these consumers. Then, print providers must create products and services that enable print consumers to make ‘greener’ print choices. While print providers can encourage behavior at the consumer level by providing a mix of products and services that enable behavioral modifications, the actual environmental benefits will not be realized unless consumers use the products and services in the sustainable manner intended. Therefore, firms need active involvement of consumers throughout their use of the products and services to ensure green behavior is actualized. As noted by Vargo and Lusch (2004), a product or service has no value until the customer uses the product or service.

Consumer involvement with creating product value has become popular in the field of marketing. More often firms are inviting consumers to co-produce their brands, experiences and designs, as well as help develop products (Arvidsson, 2008). An example of this is Nike ID, a project initiated by Nike Corporation in 2007 to encourage soccer fans and footwear consumers to engage with Nike by competing in an online shoe design competition. The primary purpose of this program was to foster a relationship between the Nike brand and the soccer player/fan segment of their consumer market. However, Nike ID became even more popular than expected; now Nike ID allows consumers to design their own sneakers and purchase them, which enables Nike to collect fundamental insight into what design and style preferences should be incorporated into Nike’s products. Per the logic of Vargo and Lusch, a program like Nike ID does not actualize any benefit until the offerings provided to the consumer are physically used—but with this level of consumer involvement the benefits to the producer are huge.

In this research, we will focus on how print providers can take an active role in supplying print consumers the appropriate resources and environment for making more sustainable printing choices. In particular, we will seek to answer the following questions:

- What green print behaviors are currently utilized by consumers?
- What motivates consumers to utilize green print options?
- What barriers prevent consumers from utilizing green print options?
- What informational and technological tools can be provided to consumers to motivate them to utilize more green print options? How would these informational and technological tools look and feel to best motivate consumers?
- How does one’s environment and perceptions of said environment influence his/her desire to modify his/her print behaviors and other behaviors in a green way?

Literature Review

To understand what drives consumers to engage in environmental behaviors, the extant literature offers a number of theories that address the nexus of an individual and his/her actions. Two seminal theories in this area are the Theory of Reasoned Action (Ajzen & Fishbein, 1980) and the Theory of Planned Behavior (Ajzen, 1991).

The Theory of Reasoned Action (TRA) presents a framework regarding how attitudes can predict behavioral goals (Ajzen & Fishbein, 1980). This theory suggests that behavioral performance is determined by one's intention to perform said behavior. The degree of a person's intention is determined by two primary factors: one's attitudes, or behavioral beliefs toward a behavior, and the perceived norms of the focal subject.

Schiavo (2007) defines attitudes as "...a function of the person's beliefs about the consequences of such behavior" and the person's emotional response to those consequences (Cordano & Frieze, 2000). Attitudes include both the favorable and unfavorable feelings one has toward a behavior, person, concept, or idea, and gauge one's overall evaluation of that behavior, person, concept, or idea (Cordano & Frieze, 2000; Schiavo, 2007). As attitudes toward a behavior become more favorable, the intention to perform the behavior increases. So, in the case of environmental behaviors, it follows that if a person has strong convictions that environmentalism is important, then s/he will have increased intention to behave in ways that reduce their environmental impact.

The second factor that determines behavioral intention is one's subjective norms about the behavior. Subjective norms are defined as "...the opinion or judgment, positive or negative that loved ones, family, colleagues, professional organizations, or other key influentials may have about a potential behavior..." (Schiavo, 2007, p. 40). Subjective norms are determined by normative beliefs, which encompass the perceived social pressure to perform or not to perform a behavior based on the opinions and judgments of others you trust and respect. Normative beliefs include the motivation to comply with the ideas of others and the need for approval and acceptance by peers (Ajzen, 1992; Schiavo, 2007). As one's subjective norms toward a behavior become more favorable, his/her intention to perform the behavior increases. So, in the case of environmental behaviors, this theory would predict that if a person feels socially pressured to act in a way that benefits the environment, an individual will have increased intention to behave in ways that reduce their environmental impact.

An extension of the TRA, the Theory of Planned Behavior, or TPB, (Ajzen, 1991), proposes that intention is determined by attitudes and subjective norms toward a behavior, but intention is also a function of perceived behavioral control (Ajzen, 1992). Perceived behavioral control thus reflects on one's level of self-efficacy as well as the necessary support required to complete the behavior (Cordano & Frieze, 2000). As one's perceived behavioral control over specific behavior increases, intention to perform said behavior also increases.

Overall, TPB postulates that one's attitudes, subjective norms and perceived behavioral control determine one's intention to perform a behavior. "Behavioral intention indicates the amount of effort a person exerts to perform a behavior. It captures the motivational factors that produce planned behaviors" (Cordano & Frieze, 2000, p. 628). The Theory of Planned Behavior indicates that, the greater one's intention to complete a behavior or achieve behavioral goals, the more likely the behavior will be performed. Behavioral intention is thus a necessary and immediate antecedent to actual behavior (Ajzen, 1992; Cordano & Frieze, 2000). Thus, TPB supports the notion that although a person may have strong personal convictions that environmentalism is important and may feel socially pressured to act in a way that benefits the environment, this will only lead to motivational intentions if the person feels the behavior is easily actionable

Beyond Ajzen's Theory of Planned Behavior, other studies have reinforced the notion that attitude and normative beliefs determine behavioral intent. A study conducted by Minton and Rose at the University of South Carolina analyzed the effects of attitudes, personal norms, and values on environmental behaviors (Minton & Rose, 1997). Minton and Rose's study determined that "...compliance with the personal norm results in greater self-esteem while noncompliance results in feelings of guilt" (Minton & Rose, 1997, p. 39). A personal norm is therefore "an individual feeling of what one is morally obligated to do, which we would hypothesize should consequently motivate one to act in a way that is consistent with his attitudes and values, such as making environmentally friendly product choices and recycling" (Minton & Rose, 1997). Similar results were found by Ellen (1994) in a study of perceived knowledge, environmental concern, perceived consumer effectiveness, sacrifices, shopping effort, and recycling effort as measures of attitude influencing behavior. More specifically, the research indicated that the level of environmental concern and perceived consumer effectiveness are relatively high predictors of the environmental behaviors studied (Ellen, 1994). These studies supplement the Theory of Planned Behavior, but also propose that moral concern is an additional determinant of behavioral intention. According to these studies, moral concern is a predictor of attitude, and is a particularly important factor for influencing behavioral intentions that are moral in nature, such as environmental behaviors. Another factor in print users' behaviors relates to the perceived ease of undertaking that behavior.

Methodology

Focus Group

After completing a preliminary literature review to better understand some of the theories regarding what influences behavior, the first method of primary research was to hold a focus group. The purpose of this methodology was to collect qualitative data regarding current print behaviors, and what encourages and discourages print consumers to print in a green manner and participate in environmental behaviors as a whole. The focus group interview guide used to steer the questioning and the discussion can be seen in Appendix A.

Besides the researchers, the actual focus group consisted of ten employees from the focus firm. The duration of the focus group session was one hour. The study was conducted in a conference room at the focus firm, and the conversation was recorded for assistance in documenting the key findings after the event. Additionally, one of the researcher's students observed the focus group and participated as a concurrent note-taker to capture discussion highlights in real-time.

Most respondents stated they archive about 1-5% of their printed items, which means most items are read and then discarded. The items people choose to print as opposed to read on their monitor include:

- Presentations and reports,
- Items to proofread,
- Items they will need more than 15 minutes to read,
- Lists of things to look up at a later time,
- Longer e-mails and e-mail chains,
- Final version of a document for reference and use, and
- Documents that are hard to read off the monitor.

Some mentioned that in the past few years their overall print output has decreased for three reasons: (1) most items are readable through electronic means, (2) projector use has decreased the need to print out presentations or transparencies, and (3) dual screen functionality (laptop and monitor or two monitors) makes it easy to view multiple documents at once to maintain efficiency of work with less printing. As a result of these technological trends, respondents stated they are choosing to print less because the functionality of their printed items has decreased.

Our focus group revealed that there are four key tactics they tend to employ to increase the greenness of their print behaviors:

- **Utilize other technologies to avoid printing:** The technological options available like e-mail, projector use, and dual monitor capabilities are sufficient enough to discourage printing.
- **Always print duplex:** Duplexing is seen as a standard and accepted print technique. Some members of the focus group even said they cringe when a document is not duplexed.
- **Scan documents:** Scanning documents into their computer can lead to decreased printing later on through electronic distribution and use.
- **Utilize draft mode:** The perception is that, when draft mode is not combined with the 2-up feature, this is good for documents for personal use. Draft mode is likely to be insufficient quality for documents to be presented to clients.

In contrast, the focus group revealed that there are four key print options they do not like to use to increase the greenness of their print behaviors:

- **Eliminate banner sheets:** Some peers of those within the focus firm choose to not use banner sheets, which was frustrating for members of our focus group because documents would be misidentified and often therefore re-printed. Also, focus group members mentioned they like to keep their banner sheets as scrap paper for side notes, lists and telephone memos.
- **Consciously choose to single-space documents:** All focus group members came to a mutual agreement that they never consciously take the time to change their document to single-spacing if it is not already in that format.
- **Use recycled paper as default paper in printer tray:** Subjects stated that they often alternate between printing professional items for clients and items for personal use. Recycled paper is not ideal for professional prints for distribution, and therefore it becomes inconvenient to change the paper before each print. This is especially undesirable for those who use a printer with other peers in their area because it is difficult and time-consuming to change paper types.
- **Utilize 2-up mode:** Many subjects felt that 2-up printed documents are difficult to read.

In terms of motivations for making greener print choices, most participants agreed that it feels good to be environmentally friendly, and that monitoring one's print activity is an easy way to reach their personal environmental goals. Also, some focus group members felt that printing less decreases the clutter and disorganization of their desks and atmosphere, which was the main motivation for printing fewer items. Lastly, the group came to a mutual agreement that social pressure is a strong motivational factor for printing green. If there are enough peers in the office printing in a green way and encouraging it, other people will feel pressured to do so as well.

Survey

The second method of primary research was a survey of employees at the focus firm that tested a broad range of research concepts developed after the literature review and focus group. The survey collected predominantly quantitative data for later data analysis to track trends and generate propositions. The survey was created through the Qualtrics.com survey software and was disseminated by an e-mail request to employees of the focus firm.

The first step for developing the survey was to develop a list of variables captured from the preliminary literature review and the focus group. The survey would explore the relationships between these variables to determine trends and explore meaningful correlations. A number of established survey scales were used when possible (see Appendix C). The survey questions were edited, altered, and rearranged several times throughout survey development to better frame each question to ensure each component was precisely asked. The researchers conducted a small pre-test, which was a fairly informal process for this survey. The researchers invited student and faculty peers, graduate assistants, and some family members to pre-test the survey. Additionally, two managers at the focus firm pre-tested the survey because it was important for them to feel that their employees would understand the questions and see value in the survey results that would be later disseminated it to these employees. The final survey can be found in Appendix B.

Once the survey was activated, the managers collaborating on this study at the focus firm sent out a survey participation link with an introductory e-mail to their employees in the United States, Canada, and one office in Europe. The survey was live for just over three weeks. An incentive for participating in the survey was offered—a raffle drawing at the end of the survey for Amazon.com gift cards. Ninety-two respondents fully completed the survey.

Results

Survey Descriptive Statistics

Demographics

Of the 92 respondents, 63% were male and 37% were female. The age and educational background breakdowns are shown in Figures 1 and 2.

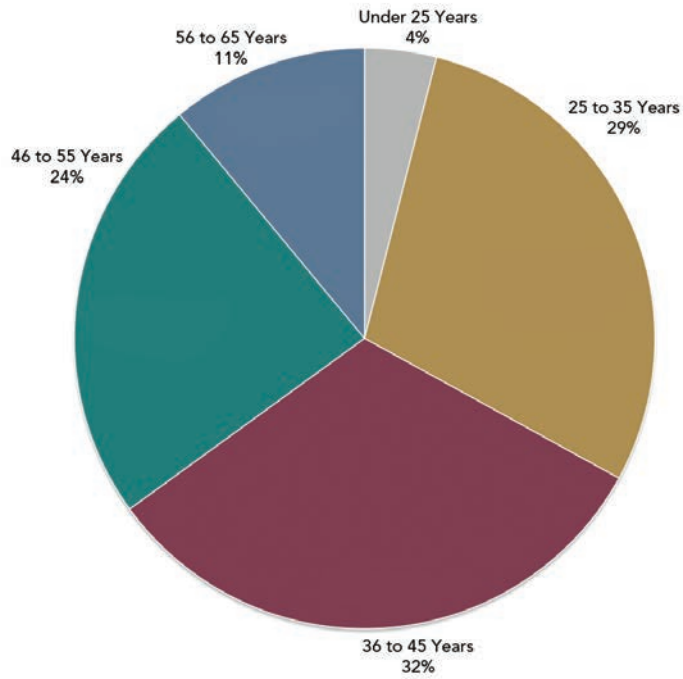


Figure 1. Age of participants

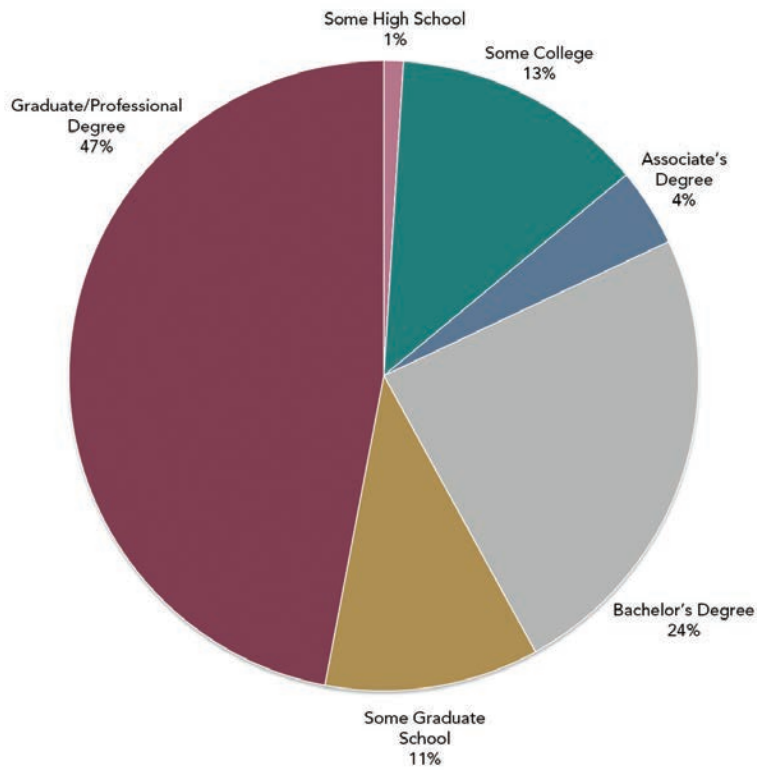


Figure 2. Education level of participants

Sixty-eight percent of the respondents worked in a company office, and the remaining 32% worked from a virtual facility off-site. The primary job responsibilities are shown in Figure 3.

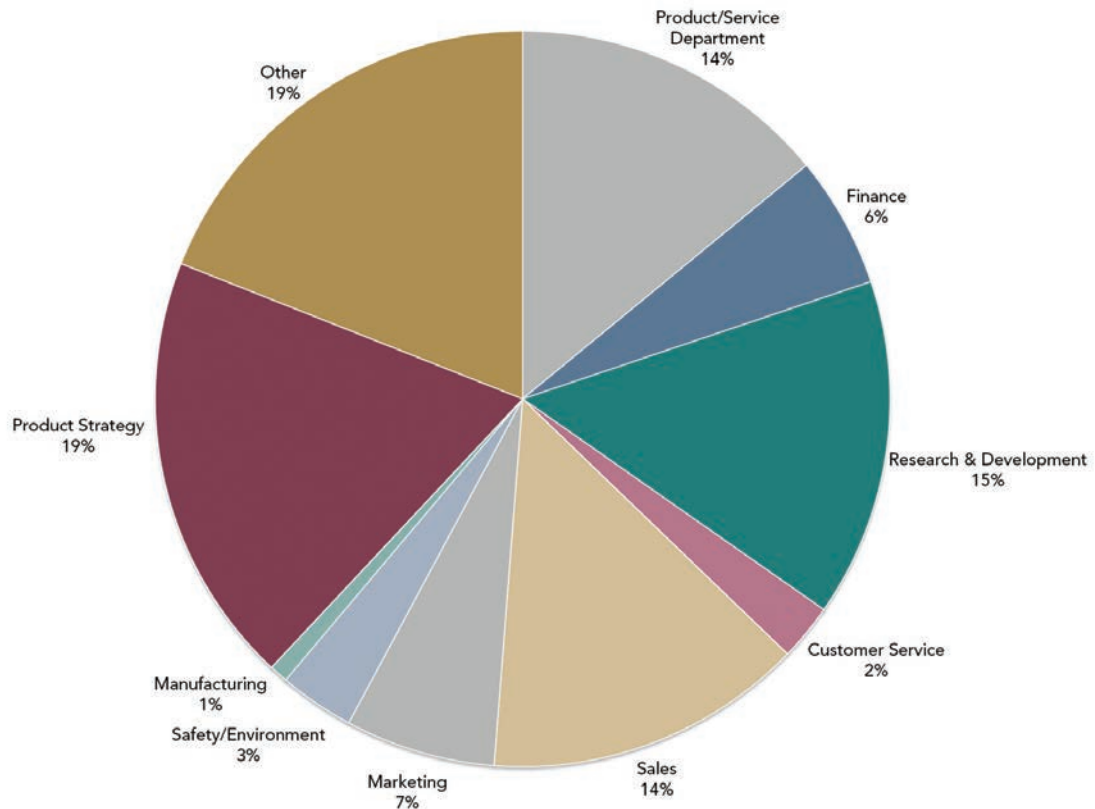


Figure 3. Primary job responsibility of participants by function

Current Print Behaviors

Seventy-seven percent of respondents utilize a printer in the workplace that is a shared printer for the department or area, while 22% of respondents use a personal printer in their office. Additionally, 54% of respondents use a color laser printer, 27% use a black-and-white laser printer, 12% use a color ink-jet printer, and the remainder (8%) use a different type of printer. On average, 34% of printed items are read and discarded, 27% are read and then stored long-term, and 30% are distributed to clients and others. The other 9% of printed items are used for miscellaneous purposes.

Respondents were asked about 16 environmental print options. Table 1 depicts the percent of survey respondents who utilize these environmental print options in each of three ways: as a default setting or, for those settings that were not default, if they use it for (1) personal use or (2) to give to someone else.

Table 1. Use of environmental print options by participants

Print Options	Use as Default Setting	Use if NOT Set as Default for Personal Use	Use if NOT Set as Default to Give to Others
Recycled Paper	21%	15%	7%
Duplex Printing	49%	55%	48%
Font Size Below 12 pt	24%	39%	21%
Eco-font	3%	7%	5%
Delayed Print	5%	9%	5%
No Banner Sheet	42%	7%	7%
Watermark	2%	1%	3%
Single-Spaced Text	27%	29%	18%
Straggler/Orphan Control	5%	14%	10%
2-up or More Per Page	12%	33%	9%
Draft Print Mode	13%	26%	7%
Minimize Margins	20%	39%	17%
Toner-Save Mode/Decrease Ink Volume	11%	17%	7%
No Color	15%	28%	10%
Print Preview	30%	50%	36%
No Images	2%	8%	5%

Not surprisingly, 49% of respondents use duplex printing as a default print setting. However, only 21% of respondents tend to use recycled paper as a default. It is interesting to note that 30%, 27%, and 24% of respondents use print preview, single-spaced text, and font size below 12-point, respectively, as the next most commonly-used green print settings. Furthermore, when a print option is not a default, respondents tend to use these settings more often for personal print items than for items to be distributed to others.

Desire for Hypothetical Green Print Tools and Information

Respondents were asked what reminders they would be interested in receiving at the time of printing to ensure they utilized green settings. This question was asked on a scale of 1-3, with 1 representing 'Never,' 2 representing 'Occasionally,' and 3 representing 'Every time I print.' As seen in Table 2, respondents were most interested in being reminded to print double-sided, to print with no banner sheet, to print with recycled paper, and to print in toner-save mode.

Table 2. Ranking of reminders for green print options

How often do you want the following reminder: "Do you want to Print...	Average Score*	Percentage of Respondents Who Chose 3
...Double Sided?"	2.6	64%
...with no banner sheet?"	2.6	63%
...with a water mark?"	1.5	13%
...from the recycled paper tray?"	2.3	47%
...2-up per page?"	1.7	14%
...in draft mode?"	2.0	33%
...in toner-save mode?"	2.3	46%
...with an eco-font?"	2.1	35%
...with no stragglers/orphans?"	2.2	44%
...with the margins minimized?"	2.1	34%
...in delayed print mode"	1.5	9%
"Did you forget to single-space your document?"	1.6	14%

* 1 = Never, 2 = Occasionally, 3 = Every time I print.

The next set of questions focused on the types and frequency of information respondents would be interested in receiving regarding their print behaviors to motivate them to print in a greener way. The first question in this area simply asked people to rank their degree of interest in different types of environmental information that could be provided to them regarding the impact of their print behaviors (see Table 3).

Table 3. Degree of interest in information on print behaviors by survey respondents

Types of Information	Average Interest*	Standard Dev	Percentage of Respondents Who Chose 4 or 5
Total Costs	3.50	1.23	50%
Carbon Emissions	3.10	1.33	35%
Energy Used	3.38	1.27	47%
Paper Used	3.40	1.19	43%
Equivalent Trees Cut Down	3.17	1.33	40%
Life-cycle environment impact	3.10	1.32	35%
Solid waste created	3.22	1.27	38%
Dollars saved	3.64	1.23	61%
Ink/toner used	3.30	1.19	38%
Paper saved	3.33	1.27	45%
Energy saved	3.41	1.27	50%
Green "points" earn tokens	3.21	1.43	41%

* 1 = Not interested at all, 5 = Extremely interested

Sixty-one percent of respondents indicated that they were highly interested in receiving data about the dollars saved from the use of green print behaviors, with the next highest being data on both total costs and energy saved (50% for each). Seventy-six percent said they would want this type of data at the individual level, versus department/floor (58%), organization (47%) and building levels (40%). This suggests that as information becomes more localized, it becomes more salient to the user.

Survey Factor Analysis

As a means of creating groups to provide new insights in this exploratory research, a factor analysis was conducted over the observed variables. In the factor analysis technique, the observed variables are reduced into a smaller number of factors by modeling those observed variables as linear combinations of the factors (Bryant & Yarnold, 1994). The researchers performed a principal components analysis (PCA) with varimax rotation. Applying the Kaiser rule (eigenvalues less than one) and component scores for the derived factors, the factors that were established are discussed in the following findings.

Finding 1. There were three different motivational profiles for print consumers.

As seen in Table 4, survey respondents seemed to cluster into one of three motivational profiles: goal achievement, external pressures, and technical competence.

Table 4. Motivational factor groupings

Factor Name	Characteristics of Factor
Achieving Goals Motivation	People who are motivated by their desire to achieve their personal goals or the corporation's goals
External Pressures Motivation	People who are motivated by external factors such as incentives, appearance to peers, and meeting job performance requirements
Technical Competence Motivation	People who are motivated by their technical ability to accomplish a task

Finding 2. Different types of green behaviors could be grouped into factors.

Table 5 depicts three behavioral factors determined from the survey results that describe different behavioral profiles of survey respondents in regard to green behaviors.

Table 5. Green behavior factor groupings

Factor Name	Survey Questions that Determined Factor	Characteristics of Factor
Recycling Behaviors	Question 12, Parts 1-3	Behaviors focused on recycling cans, bottles, and paper/cardboard
Saving Energy Behaviors	Question 12, Parts 6-8	Behaviors focused on saving energy, such as turning off lights and electronics
Die-hard Environmentalist Behaviors	Question 12, Parts 4-5	Less common green behaviors, including carpooling and utilizing electronic devices to avoid printing

Table 6 depicts four additional factors developed from the survey.

Table 6. Value, belief, and attitudinal factor groupings

Factor Name	Survey Questions that Determined Factor	Characteristics of Factor
Co-worker Influence	Question 13, All Parts	Measures the degree to which they care what their co-workers think about them
Lead User Behaviors	Question 16, Parts 1-8	Measures the degree to which they believe that respondent is a lead user of technology
Corporate Identification	Question 16, Parts 9-12	Measures the degree to which they identify with their organization and care about the organization’s success and image
Green Corporation Culture	Question 11, Parts 1-5	Measures the degree to which they believe that their organization values environmentalism
Cultural Relevance	Question 11, Parts 6-9	Measures the degree to which they believe that the organization demonstrates its environmental goals and how employees fit into those goals
Environmental Attitudes	Question 17, All Parts	Measures the degree of environmental awareness and concern

Survey Correlations

When correlating motivational profiles with green behaviors, we found that those that were motivated by achieving goals were significantly more likely to engage in recycling (a correlation coefficient of .358) and saving energy (.248). There was no statistically significant relationship between these behaviors and the other motivational profiles. Those motivated by achieving goals, perhaps not surprisingly, were also significantly more likely to want information regarding the environmental impact of their printing activities (.431) and were more likely to appreciate green print options as a default on their printer. We also found that the more an individual identifies with his or her company, the more likely they were to engage in recycling behaviors (.365).

Discussion

After reviewing the results and discoveries made evident through the focus group and survey results, there are several important managerial implications to note. With regard to current green print alternatives, the focus group strongly indicated that employees that have the opportunity to utilize dual screen functionality (a laptop and monitor or two monitors) choose to print less because they are able to view multiple documents efficiently without disrupting work flow. Furthermore, both the focus group participants and survey respondents indicated that printing duplex is an ideal and expected default printer setting; in fact, 49% of survey respondents use duplex printing as default. Therefore, companies who provide employees tools for dual screen functionality and coordinate office printers to default duplex printing should see a decrease in print output and paper waste. These actions will also indicate to employees that the company is investing to encourage decreased print output and enable greener printing via the employee-preferred tools.

One discovery regarding information desired by print consumers was that 61% of survey respondents were highly interested in receiving data about the dollars saved from the use of green print behaviors, which signifies that this in particular is a quantifiably strong motivation for individuals. Therefore, when print providers develop informational tools to encourage adoption of greener print behaviors, it is wise to start with financial information about savings from the use of greener behaviors. Furthermore, 47% of survey respondents prefer to have such information provided in the form of graphs and charts. Thus, print providers who develop informational tools should focus on presenting information in graphs and charts for the strongest effect.

Another critical discovery is that there are different motivational factors that influence behavior change, and that the 'Achieving Goals' motivational factor is the strongest indicator of behavioral intention. Print providers and companies that strive to optimize the sustainable actions of print consumers in the workplace need to understand the motivational profiles of their consumers and target them based upon their motivational profile. Therefore, it is critical that print providers develop their informational and technological tools with the target audience in mind. Furthermore, it may be most beneficial for print providers to develop their tools based upon the needs of those motivated by the Achieving Goals factor, since the results of this study indicate that this motivational profile has a significantly larger impact on behavioral intention than the other two profiles.

Future Research

This study was exploratory in nature and attempted to investigate a large variety of relationships and variables. Therefore, the research and discoveries learned in this study can be a useful stepping-stone for further research into a variety of topics.

One area for extended research is into the effect of the phenomenon of co-creation in the area of product sustainability. This study skimmed the concept of co-creation by exploring the types of involvement consumers prefer when making their individual print decisions, such as the types of information regarding their print decisions. Since this research investigated consumer involvement in the environmental decision process, the door is open for further research into the relationship of co-creation and environmental decision-making for both a broad context and in the printing industry in particular.

Another opportunity for future research is on the effect of branding on behavioral intention and environmentalism. This study did not explore the effect of a print provider's brand strength, personality, or perception on consumer behaviors and decisions. However, this concept would be a valuable extension of this research because it would provide insight into how the product's image and brand impacts behavior as opposed to the influence of one's environment on behavior as explored briefly in this study.

References

- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50, 179-211.
- Ajzen, I. (1992). Application of the theory of planned behavior to leisure choice. *Journal of Leisure Research*, 24(3), 207-224.
- Ajzen, I. & Fishbein, M. (1980). *Understanding attitudes and predicting social behavior*. Englewood Cliffs, NJ: Prentice-Hall.
- Arvidsson, A. (2008). The ethical economy of consumer coproduction. *Journal of Macromarketing*, 28(4), 326-338.
- Ashforth, B. E., & Mael, F. A. (1996). Organizational identity for strategy as a context for the individual. *Advances in Strategic Management*, 13, 19-64.
- Bryant, F. B., & Yarnold, P. R. (1994). Principal-components analysis and exploratory and confirmatory factor analysis. In L. G. Grimm & P. R. Yarnold (Eds.), *Reading and understanding multivariate statistics* (pp. 1-18). Washington, DC: American Psychological Association.
- Cordano, M., & Frieze, I. (2000). Pollution reduction preferences of U.S. environmental managers: Applying Azjen's theory of planned behavior. *Academy of Management Journal*, 43(4), 627-641.

- Douglas, P. C., Davidson, R. A., & Schwartz, B. N. (2001). The effect of organizational culture and ethical orientation on accountants' ethical judgements. *Journal of Business Ethics*, 34(2), 101-121.
- Ellen, P. S. (1994). Do we know what we need to know? Objective and subjective knowledge effects on pro-ecological behaviors. *Journal of Business Research*, 30, 43-52.
- Holliday, C. O. Jr., Schmidheiny, S., & Watts, P. (2002). *Walking the talk: The business case for sustainable development*. San Francisco, CA: Berrett-Koehler Publishers.
- Iacobucci, D. (2010). *MM*. Mason: South-Western Cengage Learning.
- Lawrence, A. T., & Weber, J. (2011). *Business and society: Stakeholders, ethics, public policy* (13th ed.). New York, NY: McGraw-Hill Irwin.
- Minton, A. P. & Rose, R. L. (1997). The effects of environmental concern on environmentally-friendly consumer behavior: An exploratory study. *Journal of Business Research*, 40, 37-48.
- Ozaki, R. (2011). Adopting sustainable innovation: What makes consumers sign up to green electricity? *Business Strategy and the Environment*, 20(1), 1-17.
- Schiavo, R. (2007). *Health communication: From theory to practice*. Hoboken, NJ: John Wiley & Sons.
- Stanford, D. (2011, April 4). Why sustainability is winning over CEOs. *Businessweek*.
- Vargo, S.L., & Lusch, R.F. (2004). Evolving to a new dominant logic for marketing. *Journal of Marketing*, 68, 1-17.
- Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly*, 27(3), 425-478.

Appendix A: Focus Group Guide

Focus Group Guide

Focus Group from 11:00am to 12:00pm

Background: We are doing research on how people print. The largest component of our project will be a survey, so we decided holding a focus group would prove very helpful in making sure we address the right things in our survey and make sure we are on the right track.

1. What do you print the most and why?
 - a. How long do you tend to keep these printed documents before ultimately disposing of them?
 - i. What do you do with these documents?
 - ii. What percent do you file?
 - iii. Has this changed in the past 10 years?
 - iv. Are your printing habits at home and work different? Do you print work things at home, or print personal things at work?
 - b. What makes you choose to print out a document instead of keeping it confined to a view on-screen?

By 11:15, start:

2. I want you to think about your current print behaviors. Do you find that you try to print in a green way, or do you typically not think about this when printing?
 - a. If you do NOT print in a green way, why don't you?
 - b. If you do, what is your motivation or drive to print in a green way?
 - c. What options do you have to print in a more green way?
 - i. Not print
 - ii. Paper type
 - iii. Double sided, 2up, Draft mode, etc?
 - d. What are the obstacles to doing these things?
 - i. Don't know how
 - ii. Takes too much effort per print
 - iii. Poor quality

- e. What would encourage you to print in a more green way? This could be something informational, technological, or motivational.
 - i. If there was a software-enhanced tool making it easier for you to print green, what would you expect it to look like and do?
 - 1. Remind?
 - 2. Provide green information?
 - 3. Automatically adjust settings to maximize greenness?
 - 4. Extrapolate my green behaviors at a global level?
 - 5. Show printing/greenness trends?
 - 6. Provide motivations for ecologically sound printing behavior?
 - ii. What type of information would you want?
 - 1. Statistics
 - 2. Items showing how green you were in a positive light, or items showing how not green you were in a negative light
 - 3. Fun facts about green printing
 - 4. Tips and hints to print more green
 - iii. Do you want your print decisions made for you automatically?
 - 1. Do you prefer having options of how you want to print?
 - 2. At what level do you like having these decisions made for you?

By 11:50, start:

- 3. Are YOU green?
 - a. What makes you green or makes you not green?
 - b. How does your printing behavior fit into this?

Appendix B: Survey

Introduction¹

Dear Sir/Madam,

The focus firm, in collaboration with RIT Professors Sandra Rothenberg and Joseph Miller, is collecting data for a study on environmental print behaviors. Your help in this study would be tremendously appreciated. It involves taking about 15-25 minutes out of your busy day to respond to a series of questions concerning your attitudes and printing habits.

Is there an incentive for participating?

Yes there is! At the end of the survey, you have the option to leave us your name and e-mail address so that we may enter you for a raffle drawing. We will be selecting names from the survey at random to be chosen for great prizes: one \$100 gift card for Amazon.com, one \$50 gift card for Amazon.com, and TEN \$10 gift cards for Amazon.com. The information you provide to enter the raffle will be kept confidential and not linked with the actual survey data.

Will your answers be confidential?

The data from all completed surveys will be collected by me personally and no personal data will be attached to any responses. While the results of the research study may be published, your name or identity will never be used.

What if you have questions or require additional information?

Contact Information was provided.

What will this information be used for?

Knowledge gained from this study will help us understand the most effective ways to encourage office workers to make environmentally responsible print choices. In addition to broadening the knowledge in this field, it will also help the focus firm design products and services that help our customers make the best choices.

Completion of the survey will be considered your consent to participate. Thanks in advance for your help!

Sincerely,

Kaity Werner

¹ - Some information was omitted in order to uphold confidentiality and privacy requirements.

Glossary

In this survey we may use some terms that can be interpreted in a variety of ways. Please review the following terms before taking the survey.

- **Environmental / Environmentally Sustainable / Green / Sustainable** - We use these terms interchangeably to indicate a lower impact on the natural environment.
- **Default Settings** - The settings that are automatically used when you print something.
- **Draft Mode** - The highest-speed, lowest-quality print mode that uses less ink output.
- **Toner-Save Mode** - The highest-speed, lowest-quality print mode that uses less toner output.
- **2-Up or More** - Two or more page images per printed page.
- **Straggler / Orphan** - Words or lines at the beginning or end of a document that are left dangling at the top or bottom of a column or the next printed page.
- **Watermark** - A faded text code that is printed on a document to identify the file's owner.
- **Banner Sheet** - A separator page printed with each document output that shows the document name, printed by, date and time listed in large print to show ownership of the document.
- **Eco-font** - A font that, when used, minimizes the amount of ink used to print the text in a document.
- **Minimize Margins** - Decreasing the width of the blank space above, below, and on either side of text in a document. By doing this, more text can fit on one page.
- **Print Preview** - The option to view exactly what your printed page(s) will look like before physically printing them.
- **Delayed Print** - Submitted documents do not print until the user cues it to print at the physical printer.

Ok - now you are ready to take the survey! By clicking below, you understand that your participation is completely voluntary. Choosing not to participate will have no adverse consequences and you can choose to end the survey at any time.

Survey Questions

Please describe the printer you use most often at work.

1a. Where is your printer located?

- At my desk
- Area printer on my floor
- Other

1b. Ink Type

- Color Ink Jet
- Black and White Ink Jet
- Color Laser
- Black and White Laser
- Solid Ink
- Other _____

2. Approximately what percentage of what you print at work falls into the following categories? Total must sum to 100%.

- _____ Items that you will read yourself and then discard
- _____ Items that you will read yourself and put in long term storage
- _____ Items that you will distribute to others
- _____ Other

3. We would like to know more about what settings you use when you print. Which of the following "greener" print features do you typically use? Check all that apply.

Setting	On the printer I use the most at work, these options are set as "default":	When printing documents in the office for MY OWN USE, I will typically choose these options if they are NOT set as default:	When printing documents in the office for DISTRIBUTION TO OTHERS, I will typically choose these options if they are NOT set as default:
Recycled paper			
Duplex printing			
Font size below 12 pt			
Eco-font			
Delayed print			
Banner sheet			
Watermark			
Single-spaced text			
Straggler / Orphan control			
2-up or more per printed page			
Draft print mode			
Minimize margins			
Toner-save mode / Decreasing ink volume			
No color (if using a color printer)			
Print preview			
No images			
Other			

4. If there was a technological tool that enabled you to create a "Green Print Setting" you could use with one click of your mouse to print your documents in a more environmentally sustainable manner, which of the following print features would you choose to include as the default settings? Please check all that apply.

- Recycled paper
- Duplex printing
- Font size below 12 pt
- Eco-font
- Delayed print
- No banner sheet
- Watermark
- Single-spaced text
- Straggler / Orphan control
- 2-up or more per printed page
- Draft print mode
- Toner-save mode / Decreasing ink volume
- Minimize margins
- Print preview
- No color (if using a color printer)
- No images
- Prints to a printer with a smaller environmental footprint, which may be further away from my desk
- Other _____

5. Indicate the extent to which you would like to have the following settings your "default" settings for the printer you use the most at work.

Setting	Dislike Very Much	Dislike	Neither Like nor Dislike	Like	Like Very Much
Duplex printing					
No banner sheet					
Watermark					
Recycled paper					
2-Up or more per printed page					
Draft mode					
Toner-save mode / Decreased ink volume					
Eco-font					
Straggler / Orphan control					
Minimize margins					
Delayed print					
Other					

6. Please chose which of the following automatic reminders you would like when they are NOT chosen as your "default" print settings?

"Do you want to print...	Never	Occasionally	Every Time I Print
...double-sided?"			
...with no banner sheet?"			
...with a watermark?"			
...from the recycled paper tray?"			
...2-up per page?"			
...in draft mode?"			
...in toner-save mode?"			

Appendix B: Survey

"Do you want to print...	Never	Occasionally	Every Time I Print
...with an eco-font?"			
...with no straggler/orphan lines?"			
...with the margins minimized?"			
...in delayed print mode?"			
"Did you forget to single-space your document?"			
Other			

7. What types of environmental information would you like provided to you regarding the impacts of your print behavior?

Information	Not Interested at All	Very Interested	Extremely Interested
Total costs			
Carbon emissions			
Energy used			
Paper used			
Equivalent trees cut down			
Life cycle environmental impact			
Solid waste created			
Dollars saved			
Ink/toner used			
Paper saved			
Energy saved			
Green "points" earned towards a reward			
Other			

8. When presented information on your print consumption, there are many ways to aggregate and present the data. Please indicate at what level you would like information aggregated. Check all that apply.

- Individual
- Department/Floor
- Building
- Organization

9. Indicate how much you like the following options:

Option	Dislike Very Much	Dislike	Neither Like nor Dislike	Like	Like Very Much
A "green" button that the user can select to automatically print using CORPORATE-defined environmental settings.					
A "green" button that the user can select to automatically print using USER-defined environmental settings.					

10. By dragging each item vertically in rank order, please rank how effective the following three formats of information would be in motivating you to choose more environmentally friendly print behaviors.

- _____ Pictures and Images
 - _____ Brief Facts and Statistics
 - _____ Graphs and Charts
- (There were 3 images provided)

11. Please indicate the extent to which you agree with the following statements regarding your primary place of work:

My company...	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
...considers impacts on broad ranges of stakeholders when making major decisions					
...regularly factors in non-financial objectives in project target returns					
...works to reduce negative impacts on stakeholders					
...is transparent about its impact on the environment					
...values environmental protection					
..."walks the talk" with regard to its stated environmental policy					
...regularly communicates its environmental goals with its employees					
...makes it clear how my job is linked to its environmental goals					
...rewards employees for being "green"					

12. When at work, how often do you do the following to reduce your environmental impact and/or save resources?

Action	Never	Rarely	Sometimes	Often	Very Often
Recycle cans					
Recycle bottles					
Recycle paper/cardboard					
Use electronic devices to avoid printing					
Carpool or take alternative transportation to work					
Turn off lights when leaving a room					
Turn off printer at night					
Turn off computer when not in use for long periods of time					
Other					

Appendix B: Survey

13. Please indicate the extent to which you agree with the following statements:

Most of my co-workers...	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
...recycle					
...are environmentally conscious of their actions.					
...would think less of me if I am not environmentally conscious.					
...are aware of the company's standards on environmental sustainability.					
...are satisfied with the company's standards on environmental sustainability.					

14. Please indicate how strongly you agree with the following statements:

When I choose to use green print options, it's because....	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
...I believe that changing my print behaviors will have an environmental impact.					
...I am technically savvy enough to know how to change my print settings.					
...I will get an incentive or reward.					
...I want my coworkers to think highly of me.					
...I want to be a role model to my coworkers.					
...it is the right thing to do.					
...it will save the company money.					
...I am being told to do it.					
...it will help the company meet their environmental goals.					
...it will affect my performance evaluation.					
Other					

15. Please indicate how strongly you agree with the following statements:

When I chose NOT to use green print options, it's because....	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
...I don't think it will have a significant environmental impact.					
...I don't have time to change print settings.					
...I don't understand what print options are "greener."					
...I don't know how to change print settings.					
...I think it will lead to lower print quality.					
...the default print settings are made by the company, so it is not my responsibility to change my print behavior.					
...it will not effect my performance evaluation.					

When I chose NOT to use green print options, it's because....	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
...green printing is low on my list of priorities.					
...I have a lower awareness of my environmental impact at work than at home.					
...I am being told to do it.					
...there are no rewards or incentives for printing green.					
...I don't know how the way I print impacts the environment.					
...I don't get any information on my print performance.					
Other					

16. To what degree are the following statements like you?

Statement	Not at all like me	Not much like me	Somewhat like me	Quite a lot like me	Just like me
I like to experience novelty and change in my daily routines					
If I like a certain technology, I rarely switch from it just to try something different.					
I am very cautious in trying new and different technologies.					
I prefer a routine way of life to an unpredictable one full of change.					
I am the kind of person who would try any new technology once.					
I would rather wait for others to try a new technology than to try it myself.					
I am continually seeking new ideas and experiences.					
When I hear about a new technology, I take advantage of the first opportunity to find out more about it.					
When someone criticizes my place of work, it feels like a personal insult.					
I am very interested in what others think about my work organization.					
If a story in the media criticized work organization, I would feel embarrassed.					
My work organization's successes are my successes.					

Appendix B: Survey

17. Please indicate the extent to which you agree with the following statements.

Statement	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
Environmental degradation is an important problem for humanity.					
Overall, print is harmful to the environment.					
I am personally concerned about environmental degradation.					
When humans interfere with nature, it often produces disastrous consequences.					
Mankind is severely abusing the environment.					
Humans have the right to modify the natural environment to suit their needs.					
We are not doing enough to save scarce natural resources.					
Natural resources must be preserved, even if people must do without some products.					

18. Please take a few moments to describe any comments or complaints you have regarding your current printer. You may also share with us any ideas for what technological tools or information could be provided to you to encourage you to print in a more environmentally sustainable manner.

19. What is your gender?

- Male
- Female

20. What is your age?

- Under 25
- 25 - 35
- 36 - 45
- 46 - 55
- 56 - 65
- 66 - 75
- Over 75

21. What is your highest level of education?

- Some high school
- High school graduate/GED
- Some college
- Associate's Degree
- Bachelor's Degree
- Some graduate school
- Graduate/Professional Degree

22a. What is your nation of origin?

22b. In which country do you currently reside?
(Countries were listed in a drop-down menu)

23. Where do you typically work?

- Company Office
- Virtual Facility (home office, etc)
- Customer Location

24. How long have you been at your current company?

- Up to 1 year
- 1 year - up to 2 years
- 2 years - up to 5 years
- 5 years - up to 10 years
- 10 years - up to 20 years
- More than 20 years

25. What is your primary job responsibility?

- Product/Service Development
- Finance
- Research and development
- Legal
- Customer service
- Sales
- Marketing
- Safety and/or Environment
- Logistics and Fulfillment
- Manufacturing
- Product Strategy
- Human Resources
- Other _____

OPTIONAL: In order for you to be eligible for the random drawing for prizes associated with this survey, you must provide us with some way for us to contact you. Phone number OR e-mail address would be fine. This information will remain confidential and WILL NOT be linked to the other survey data. Please feel free to leave any or all of this information blank, however please understand that doing so will leave you out of consideration for the respective prize drawing.

That's all! Thank you for participating in this survey. Please be assured that your answers will remain absolutely confidential. Once again, your participation was critical for the success of this research endeavor, and we greatly appreciate your candor. Please hit "Next" to submit your completed survey. Thank you!

Appendix C: Scales Used in Survey

Survey Question	Variables the Survey Question Relates To	Source Question is Adapted From	Our Title For Scales
1	Printer location/type	Created for this research	N/A
2	Technology: ease of use, green print option settings, personal vs. professional print modes Outcomes: green print choices	Created for this research	N/A
3	Technology: ease of use, green print option settings, personal vs. professional print modes Outcomes: green print choices	Created for this research	N/A
4	Technology: ease of use, green print option settings, personal vs. professional print modes Outcomes: green print choices	Created for this research	N/A
5	Technology: ease of use, green print option settings, forced default settings for green printing Outcomes: green print choices	Created for this research	N/A
6	Technology: ease of use, green print option settings, forced default settings for green printing Customer: environmental attitude Outcomes: green print choices	Created for this research	N/A
7	Information: negative statistics, positive statistics, type of information	Created for this research	N/A
8	Information: negative statistics, positive statistics, frequency of information	Created for this research	N/A
9	Technology: green print options, ease of use Customer: environmental concern, technological ability, willingness to conform/be told what to do	Created for this research	N/A
10	Information: negative statistics, positive statistics, type of information	Created for this research	N/A

Appendix C: Scales Used in Survey

Survey Question	Variables the Survey Question Relates To	Source Question is Adapted From	Our Title For Scales
11	Company: corporate culture, social pressure, incentives from company Customer: role understanding, environmental concern, perceived consumer effectiveness, corporate identity	Scale Name: Power: Social Power Scales Source: Swasy, J.L. (1979). Measuring the bases of social power. <i>Advances in Consumer Research</i> , 6, 340-346.	Corporate Environmental Culture Scale
12	Customer: role understanding, environmental concern	Created for this research	N/A
13	Company: social pressure	Scale Name: Injunctive Environmental Norm Measure Source: Minton, A. P. (1997). The effects of environmental concern on environmentally friendly consumer behavior: An exploratory study. <i>Journal of Business Research</i> , 40(1), 37-48.	Peer Influence on Environmental Concern Scale
14	Customer: role understanding, environmental concern, corporate identity, willingness to conform/be told what to do Company: corporate culture, social pressure, incentives from company	Scale Name: Leisure: Subjective Leisure Scales Source: Unger, L., & Kernan, J.B. (1983). On the meaning of leisure: An investigation of some determinants of the subjective experience. <i>Journal of Consumer Research</i> , 9, 381-392.	Positive Indicators of Greenness Scale
15	Customer: role understanding, environmental concern, corporate identity, willingness to conform/be told what to do Company: corporate culture, social pressure, incentives from company	Scale Name: Leisure: Subjective Leisure Scales Source: Unger, L., & Kernan, J.B. (1983). On the meaning of leisure: An investigation of some determinants of the subjective experience. <i>Journal of Consumer Research</i> , 9, 381-392.	Negative Indicators of Greenness Scale
16	Customer: environmental concern, perceived consumer effectiveness, willingness to conform/be told what to do	Scale Name: Change Seeking Index Source: Steenkamp, J.E.M., & Baumgartner, H. (1994). Development and cross-cultural validation of a short form of CSI as a measure of optimum stimulation level. <i>International Journal of Research in Marketing</i> , 12, 97-104. Scale Name: Exploratory Buying Behavior Tendencies Source: Baumgartner, H., & Steenkamp, J.E.M. (1996). Exploratory consumer buying behavior: Conceptualization and measurement. <i>International Journal of Research in Marketing</i> , 13, 121-137.	Technological Exploration and Corporate Identification Scale

Appendix C: Scales Used in Survey

Survey Question	Variables the Survey Question Relates To	Source Question is Adapted From	Our Title For Scales
17	Customer: perceived customer effectiveness, environmental concern, role understanding	<p>Scale Name: Environmental Concern Measure Source: Minton, A. P. (1997). The effects of environmental concern on environmentally friendly consumer behavior: An exploratory study. <i>Journal of Business Research</i>, 40(1), 37-48.</p> <p>Scale Name: Environmental Consciousness Source: Hartmann, P., & Apaolaza-Ibanez, V. (2006). Virtual nature experiences as emotional benefits in green product consumption: The moderating role of environmental attitudes. <i>Environment and Behavior</i>, 40(6), 818-842.</p> <p>Scale Name: Environmental Concern (EC) Scale Source: Roberts, J.A. (1996). Green consumers in the 1990s: Profile and implications for advertising. <i>Journal of Business Research</i>, 60(3), 217-231.</p>	Environmental Attitude Scale
18	<p>Technology: problem with current features, green print options, ease of use</p> <p>Information: negative statistics, positive statistics, frequency and type of information</p>	Created for this research; Open-ended question	N/A
19-25	Demographic questions	Created for this research	N/A



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