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Willingness to pay for Bio-based footwear in Indonesia

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Executive Summary

Petrochemical-based plastics are used extensively in the production of shoes; however, large-scale use of plastic can cause large amounts of CO_2 emissions and environmental damage through the extensive amount of time that is needed to dissolve plastic. An alternative to the use of conventional plastics in the development of footwear is bio-based plastics. This study investigates the Indonesian consumer preferences towards bio-based plastic footwear using choice-based conjoint analysis as not much data is available on this from previous research. Information regarding trade-off can be used by brand marketing managers to develop products that are attractive to Indonesian consumers while also being environmentally sustainable. The study also analyzes the effect of eco labels on consumers' preferences when purchasing footwear, in particular, two types of labels: self-declared and government eco labels. To achieve this, a survey regarding consumer preferences of bio-based plastic footwear was distributed.

This study examines the willingness to pay for bio-based footwear of Indonesian consumers using choice based conjoint analysis. The attributes studied in this conjoint research include price, material, eco-label, and lifespan. The main research question is:

- How do price, material, eco label, and lifespan influence willingness to pay for bio-based footwear in the Indonesian market?

Segmentation analysis was implemented to investigate the differences in consumer preferences based on socio-demographic and pro-environmental behavior. To evaluate pro-environmental behavior, respondents' behavior regarding environmental behaviors were asked in the survey, specifically green self-identity, reduce, reuse, and recycle behavior. Therefore, the sub research questions are:

- To what extent are the differences in perceived value influenced by age, income level, education level, and gender?
- Does a consumer's green self-identity and behaviors to reduce, reuse, and recycle affect their perceived value?

Data was collected via a survey that was distributed in June, 2022, to people of Indonesian citizenship. The survey consisted of 3 parts, namely: 1) questions regarding socio-demographics; 2) questions regarding consumer's pro-environmental behavior; and 3)

questions of choice based conjoint experiment. 284 respondents filled in the survey with a 91% completion rate. The sample depicts the young educated urban Indonesian consumer. The conjoint analysis part of the survey consisted of 8 conjoint questions with 2 alternatives provided in each question. Thus, binary logistic regression was used for the analysis. Willingness-to-pay analysis analyzed the sample population's amount of money that they were willing to pay for a certain attribute. Finally, segmentation analysis analyzed differences in utility gained based on demographics and pro-environmental behavior.

The results of the analysis indicated young educated Indonesian consumers are willing to pay more for a government eco label (€28) than a self-declared eco label (€17), both types of labels showed in increase in willingness-to-pay compared to no eco label at all. Material is the most important attribute for the young educated urban Indonesian consumer as a 1% increase in bio-based plastic material led to an increase of willingness to pay of €0.4. 1 year increase in footwear lifespan increased the willingness-to-pay by €13.9. Insights gained from this research show that green consumers prefer footwear products with certified eco labels, such as a government or self-declared eco label, while less green consumers put less emphasis on the eco label of their footwear. However, no evidence is found that difference in socio-demographic effects the consumer preference of the sample.

The results of this study can help to promote footwear products being made from bio-based plastic as brand and marketing managers can utilize the results in their strategies. When targeting young educated urban Indonesian consumers, brand managers should put more emphasis on producing footwear with a greater percentage of bio-based plastic. In addition, obtaining a government eco label certification can attract more consumers to purchase the product, as this is a feature that provides easy evaluation of the environmental impact of the product.

1. Introduction

The massive consumption of shoes has led to the footwear market being worth an estimated US$365.5 billion in 2020, with a forecast of growing to US$530.3 Billion by 2027 (Chouhan et al., 2020). Sixty-six million pairs of shoes were produced, and 49 million pairs were bought, by consumers in 2020, making the footwear industry the 20th largest industry worldwide (Footwear, 2022). Around 82.3% of footwear production takes place in Asia, which leads to massive import and export activity (Statista, 2021a). In 2020, footwear exports and imports were worth US$ 1.7 Billon and US$ 584 million, respectively (Footwear, 2022).

Shoes are made primarily from non-biodegradable materials that harm the environment, namely plastic and rubber. 47% of shoes are made from plastic or rubber (Footwear, 2022). Typical shoes consist of several parts, including the outsole (rubber), midsole (EVA foam), insole (polyurethane foam), heel counter (petrochemical-derived material), and upper material (polyurethane leather) (Jenkins, 2003). This shows the high dependency of footwear on plastic materials. Even common running sneakers generate around 27.2 kilograms of CO_2 emissions per kilogram of shoes (Chu, 2013). 1.4% of global CO_2 emissions come from sneaker production, which is considerably higher than airplane carbon emissions that emit 2.5% of global CO_2 emissions. (Kibbey et al., 2018).

Developing bio-based plastic footwear is one option for companies to reduce their carbon emissions. During a shoe life cycle, the period of raw material manufacturing causes the largest CO_2 emissions (Serweta et al., 2019). Bio-based plastic is known to be much more environmentally friendly than conventional plastics. Bio based plastic material, such as Polylactic acid (PLA), produces 50-70% fewer CO_2 emissions and is also recyclable and compostable (Álvarez-Chávez et al., 2012). Thus, bio-based plastics have a substantial environmental impact through the reduction of global carbon emissions that result from the making of a pair of shoes.

Using bio-based plastic material in footwear has attracted consumers globally (FBR BP Biorefinery & Sustainable Value Chains et al., 2017; Horvat et al., 2018; Spierling et al., 2018). Consumers in Germany prefer a high percentage of bio plastic, a reduction of CO_2 emissions, and a raw material origin in their choice of footwear (Scherer et al., 2018). Furthermore, a study in six European countries showed a high emphasis on environmental values, such as material and eco-labels, among European consumers (Brand and Rausch, 2021). The sustainable

footwear share in the footwear market has also shown significant growth, from a 2.9% market share in 2013 to a 4.1% share in 2020 (Statista, 2021).

The environmental awareness of Indonesian customers has been growing. During the 1970s, several higher education institutions began to offer environmental law, environmental engineering, business environment, and environmental economics courses (Sudarmadi et al., 2001). Furthermore, it is becoming more and more common to find young Indonesians that regard themselves as environmentalists (Parker et al., 2018). Young Indonesians believe that what they do and use is the solution to environmental problems more so than government policy and industry shifts (Parker et al., 2018).

This research investigates consumer preferences for bio-based footwear in the Indonesian market. This involves a study of the attributes that Indonesian consumers value when it comes to bio-based footwear choices. The study of these attributes will provide the best utility for Indonesian customers. This will, in turn, provide information for brand managers to develop products that fit the preferences of customers in Indonesia.

Relevance of Study

Scientific Relevance

This study is scientifically relevant as it provides a better understanding of consumer preferences toward bio-based plastic footwear by investigating how Indonesian consumers value different attributes and features of footwear. Previous studies have explained consumer intentions toward purchasing environmentally friendly products (Ekebas-Turedi et al., 2021; Kumar and Ghodeswar, 2015; Papaoikonomou et al., 2011; Salmivaara et al., 2021). However, when it comes to understanding the consumer choice process, the knowledge of important features of the product and monetary trade-off is also important since they play an important part in consumer choice behavior (Blakney and Sekely, 1994). Eco-labelling aids consumers to be able to quickly assess the environmental friendliness of a certain product (Jin et al., 2018). Previous studies have provided insights into the regulations set for eco-label certification (Nadlifatin et al., 2016). The eco-labeling for shoes in Indonesia is divided into two labels, the government eco-label and self-declared eco-label. However, no evidence has been found regarding the impact of government and self-declared eco-label on consumer preference in Indonesia. Therefore, this research investigates factors of consumer preference through

conjoint analysis and willingness to pay analysis which contribute to the evaluation of the impact of sustainability labels.

Previous studies provide extensive information regarding bio-based footwear. Studies regarding bio-based footwear can be found in developed countries, such as Germany and the US (Brand and Rausch, 2021; Scherer et al., 2018; Wang et al., 2022). However, there is little evidence that Indonesian consumers prefer bio-based footwear. Indonesia provides a suitable context to understand consumers' preference further, given its economic prominence both in the world and in the Southeast Asian region. It ranks 10th based on purchasing power parity and is the 4th largest economy in the world (World Bank, 2022). Therefore, it provides a suitable environment for further understanding consumer preferences in Indonesia.

Social Relevance

The study is also relevant in a social perspective. Global warming has been a great threat to the planet, and using conventional plastic only accelerates the rate of global warming (Ford et al., 2022). Bio based plastic footwear is seen as one of the approaches to minimize environmental impact in the form of carbon emission reduction (Álvarez-Chávez et al., 2012). From this research, information regarding consumer perceptions towards sustainable and environmentally friendly footwear can be gained. Previous studies found that consumers find it important to purchase footwear based on the label embedded in it (Gatzer and Magnin, 2021; Petro, 2022). On the other hand, this study provides an analysis of two different eco labels - government and self-declared company eco labels. The self-declared eco label is also regulated, however, only in some parts of the product (Nadlifatin et al., 2016). This study investigates how self-declared eco labels fare against the government regulated eco label.

Managerial Relevance

This study investigates consumer preferences for bio-based footwear. The study has been conducted by quantifying the willingness to pay analysis of footwear with the attributes of price, material, eco-label, and lifespan. Therefore, a trade-off between providing certain features and the price of the footwear can be gained from this analysis. The results of this study will be of benefit to brand managers and marketing managers of footwear companies. A brand manager can benefit from this research by developing footwear that is appropriately priced based on the Indonesian consumer preferences. Meanwhile, the study results can also help marketing managers expand sales through the development of marketing strategies based on

an understanding of consumer's preferences and knowing which attribute matter most to the Indonesian consumer.

Introduction to Study

The study focuses on Indonesian consumer preferences regarding bio-based plastic footwear. To understand how consumers value footwear, several attributes were analyzed to identify the important characteristics of footwear. These attributes were price, material, eco-label, and lifespan. The conjoint analysis investigated to what extent each footwear attribute is valued by Indonesian consumers. To further understand consumer preferences based on monetary trade-offs through quantifying perceived value, willingness to pay analysis was also needed. Therefore, this research not only investigates the perceived value, but also the willingness to pay of Indonesian consumers for bio-based plastic footwear.

The study also focuses on investigating differences in consumer preferences based on demographics. Segmentation analysis was employed to further assess the perceived value based on the conjoint analysis. Previous studies have found that young women have better environmental awareness, which can affect the consumer preferences of this research (Xiao and Dunlap, 2007). It is also possible to gather insights into differences in perceived value through socio-demographic characteristics. Another approach to analyzing differences is based on consumers' pro-environmental behavior (Gatersleben et al., 2014). Pro-environmental behavior is a significant predictor of purchase decisions. Four environmental behaviors are used to assess whether these behaviors are affecting consumer preferences or not. In this study, consumer socio-demographics and pro-environmental behavior were analyzed to find differences in the perceived value of footwear.

Research Questions

Main Research Question

To understand Indonesian consumers' preferences, understanding willingness to pay is instrumental. Not only does willingness to pay show the consumer's valuation of the product, but also the monetary value of attributes. Four attributes were used in the analysis of this study: price, material, eco-label, and lifespan. Therefore, the main research question is as follows:

- How do price, material, eco label, and lifespan influence willingness to pay for bio-based footwear in the Indonesian market?

Sub-Research Questions

Differences in demography were analyzed in this study. Previous studies show that demography significantly influences product choice based on environmental attributes (Xiao and Dunlap, 2007). Differences in generation also show variations in sustainability awareness (Berthiaume, 2020). The variety of differences found in the socio-demographic characteristics led to the following sub-research question:

- To what extent are the differences in perceived value influenced by age, income level, education level, and gender?

Pro-environmental values are found to be a significant predictor of consumer purchasing decisions concerning environmentally friendly attributes (Gatersleben et al., 2014; Whitmarsh and O'Neill, 2010). Assessment was also carried out to find perceived value differences among pro-environmental values in this study. The assessment of pro-environmental values here is based on green self-identity and the three most promoted environmental values in Indonesia: reduce, reuse, and recycle behavior (Desfandi et al., 2017).

- Does a consumer's green self-identity and behaviors to reduce, reuse, and recycle affect their perceived value?

Research Structure

This study consists of several chapters which answer the research questions. The first part is the literature review, which consisted of desk research to find essential literature for the research. The second part is the methodology, which explains the analysis used to answer the hypothesis and research questions. The third part consists of the results of the analysis. In this third part, the results are explained in terms of whether the hypotheses were accepted or rejected. The last part is the conclusion, in which conclusions have been drawn based on the research results. In addition, recommendations have been provided for the managerial perspective and the limitations of this study are outlined.

2. Literature Review

The literature review chapter contains information obtained from existing literature that provided insights into this research. The first part of the review contains findings from existing literature regarding bio-based plastic shoes. From this information on bio-based shoes,

industry-level information was derived, from the shoes' materials to the shoes' environmental impact. Through the bio-based plastic shoes literature review, an understanding of consumer preferences regarding bio-based footwear was derived which helped formulate the research hypothesis. The second part of the literature review consists of the information gained concerning eco-labeling. Information was gained from existing implementation in Indonesia and from analysis of European countries. The analysis of European countries was necessary due to the limited literature evidence available in Indonesia. From the eco-labeling information, insights for the conjoint and hypothesis formulation were obtained. The third part of the literature review concerns footwear lifespan which provided insights into the implementation of the lifespan attribute in the conjoint analysis. The fourth aspect of the literature review contains information on pro-environmental values which provided the necessary insights for developing a suitable segmentation analysis of consumer preference based on respondents' pro-environmental behavior. The last part consists of the hypothesis formulation which was based on the information generated by previous sections.

2.1 Bio-based plastic shoes

A pair of shoes that are considered bio-based plastic footwear are made of raw materials that are bio-based or renewable materials with potential for biodegradability (Nanda et al., 2022). The origin of the material is significantly less harmful to the environment (Serweta et al., 2019). Bioplastics are plant-based materials rather than petrochemical-based as in conventional plastic creation. Bio-based plastics have a major advantage in terms of the biodegradability of the material. Several bio-based plastic materials can biodegrade completely after 3-6 months after the end-of-life cycle of the product (Nanda et al., 2022). In contrast, petrochemical-based plastics take centuries to biodegrade. Bioplastics cause much less environmental damage during production than petrochemical-based plastics do, as bioplastic production is considered carbon neutral. Petrochemical-based plastics, however, emit large amounts of greenhouse gases in their production. The availability of bioplastic materials is helping shift human dependency on fossil fuels to bio-based products, including in the footwear industry.

Bio-based footwear contains different amounts of bioplastic and comes in varying degrees of biodegradability. When making bio-based footwear, companies should choose carefully which material they use. A biodegradable bio-based product can provide a better end of life but can also deliver a less durable product. Partial bio-based footwear often uses a bioplastic combined with fossil-based material, such as bio-PET and starch or PLA blends with biodegradable

fossil-based copolymers. Fully bio-based footwear does not contain any fossil-related material. Materials often used for fully bio-based products include TPS, PLA, PHA, and Bio PE (Nanda et al., 2022). The choice of materials is summarized in Table 1.

	Fossil Based	**Partial Bio-Based**	**Fully Bio-Based**
Non-Biodegradable	PET, PU, PE, PP, PBT, PVC, PUR, PA6	Bio PET, PA 610, and PTT	Bio PE, PA 11
Biodegradable	PCL, PBS, PBSL, PCBS	Starch blends and PLA blends	TPS, Starch Cellulose, PLA, PHA, Cellulose acetate, and PO3G

Table 1. *Types of plastic material for footwear*

Bio-based plastic materials have varying effects on consumer preference. In Germany, consumers have high regard for their purchase of outdoor apparel, and a higher percentage of bio-based plastic is preferred (Scherer et al., 2018). Environmental awareness also affects consumer preference (Brand and Rausch, 2021). Green consumers consider the environmental aspect and impact of the product, and pay attention to details such as material, material origin, and eco-label (Brand and Rausch, 2021). Meanwhile, non-green consumers consider fewer environmental attributes (Brand and Rausch, 2021).

2.2 Eco Label

The development of the eco-label program in Indonesia began in 1994 and was initiated by the Ministry of Environment and Forestry (Setiawan et al., 2019). Despite being initiated in 1994, it was only in 2014 that the Ministry of Environment and Forestry set a logo for eco-label (Razif and Persada, 2016). The program has the aim of providing environmental protection through product regulation, and this regulation aims to develop greener industry innovation in Indonesia (Nadlifatin et al., 2016). The eco-label program is run through an accreditation system. The Ministry of Environment and Forestry appointed the National Accreditation Committee to audit, examine, and grant accreditation for products that are being sold in Indonesia. The products covered by eco-labeling include food, clothing, shoes, and furniture.

Two types of eco-label are in use in the Indonesian market. The first type is the eco-label “Ramah Lingkungan” accredited by the National Accreditation Committee. This eco-label encompasses the environmental aspects across the product's lifecycle, based on ISO 14024 (Nadlifatin et al., 2016). Assessment for this label considers the environmental damage caused by the raw material, production, packaging, supply chain, consumption, and end of life of a

certain product. The second type of eco-label is regarded as a “self-declared” eco-label based on ISO 14020 (Nadlifatin et al., 2016). This eco-label only covers some aspects within the lifecycle a certain product, and the company can have a partial eco-friendly business practice. The comparison of the two types indicates that the government eco-label is more environmentally friendly than the self-declared eco-label. The logo of the government and self-declared eco-labels are shown in Figure.

(1) (2)

Figure 1. *Eco Labels in Indonesia. (1) Government Eco Label, (2) Self-Declared Company Eco Label*

Eco-label is considered necessary for consumers to purchase sustainable products (Brand and Rausch, 2021; Chekima et al., 2016). It assures that the product purchased does no or less harm the environment (Bratt et al., 2011). These eco-labels are a convenient way to communicate whether a particular product meets a specific requirement, where consumers can quickly and efficiently understand the sustainability of the product. On the other hand, it also set a standard for the industry in grating a more sustainable development (Nadlifatin et al., 2016).

2.3 Shoe Lifespan

Quality measurement of a shoe is difficult, as there is a difference between perceived and objective quality (Tsiotsou, 2006). Quality factors include flexibility, structural strength, water resistance, and so on (Bitlisli et al., 2013). Perceived quality is the expectation set by the consumers towards a certain product or service as a result of marketing or social interaction (Zeithaml, 1988). On the other hand, objective quality is the actual measured quality of shoes, such as the degradation, durability, and lifespan. For this research, the shoe lifespan is used as a measurement of quality.

The lifespan of shoes is intended to reflect the quality of shoes, and perceived quality positively affects a consumer's intention to purchase (Tsiotsou, 2006; Zeithaml, 1988). Shoe quality is determined by how the shoes are produced, such as whether high-quality material, quality stitching, and great quality control are used (Boër et al., 2004). The idea of using lifespan in this research is that lifespan is easier to comprehend from both the perspectives of perceived quality and objective quality, where customers can set a realistic expectation of the quality of the shoes (Lo, 2021; Tsiotsou, 2006). Furthermore, the perceived quality by customers also positively affects brand trust and brand loyalty of sports shoe brands (Bisen and Nuangjamnong, 2021). Perceived quality can provide long-term benefits as brands can meet the expectation of customers, which builds customer loyalty to a certain brand.

2.4 Pro-Environmental Behavior

Pro-environmental behavior is human behavior towards actions that have a considered effect on the ecosystem and the planet. Pro-environmental behavior encompasses a wide range of practices stemming from the environmental perspective of a person. It is associated with terms such as green behavior, sustainable behavior, and eco-friendly behavior (Francoeur et al., 2021). To assess the effect of pro-environmental behavior on consumer preference, four questions were asked in the interview of this study regarding the respondents' environmental behavior. Respondents answered using a form of the Likert scale, which has a scoring system from 1 to 5. This research used green self-identity and the three most promoted environmental behaviors in Indonesia, reduce, reuse, and recycle (3R), to measure consumer preferences based on pro-environmental behavior (Desfandi et al., 2017). Green self-identity is a significant predictor of the pro-environmental actions of a person. For example, a person who considers themselves an environmentally friendly consumer would purchase and use products that do no or less harm to the environment (Gatersleben et al., 2014). Green self-identity encompasses a person's attitude towards an action, regardless of how the person feels about the action (Charng et al., 1988). The 3R are embedded in all the education levels in Indonesia through the government program of Adiwiyata (Desfandi et al., 2017). This program teaches young Indonesians environmental norms and attitudes through their respective schools.

- Green Self Identity: A self-green identity is commonly known as how people depict themselves regarding their environmental behavior (Whitmarsh and O'Neill, 2010). Internal and external factors influence a person's green self-identity. Internal factors come from one's own motivation, such as self-esteem and self-understanding. External

motivation originates from interactions with family and friends that lead to a person's expectation. Identity is a factor that can create harmony between behavior and values or beliefs, in which consistency in a person's behavior towards environmental values can be created through green self-identity.

- Reduce: Reduce means to minimize using products or services containing plastic or synthetic rubber. This behavior emphasizes not relying on non-biodegradable materials by using fewer of these materials and choosing sustainable products and services instead.
- Reuse: To reuse is to repurpose a certain item. It could be used as its original function or an alternate function. For example, a plastic bottle can be reused as a reusable drinking bottle (original function) or as a flowerpot (alternate faction). It is a means to not waste unsustainable materials in the environment.
- Recycle: Recycle is often confused with reuse as both concepts have the same idea to repurpose items. However, in recycling, the way to repurpose is different. Recycling requires the breakdown of the item to the form of the raw material.

2.5 Hypothesis

The hypotheses formed in this section are for the purpose of answering the research questions. Hypotheses 1, 2, and 3 were formulated to answer the main research question. Hypotheses 1 and 2 emphasize the relative importance of determining which attributes are the most and least important. The 3rd hypothesis emphasizes the monetary amount that a consumer is willing to pay for certain attributes. The 4th and 5th hypotheses were formulated to answer the sub-research questions. The 4th hypothesis addresses the first sub-research question on whether differences in pro-environmental behavior have an impact on consumer preference. Meanwhile, the 5th hypothesis addresses the second sub-research question regarding consumer preference based on differences in socio-demographics.

The study encompasses several attributes and the importance of each one. Price is commonly the most important attribute for consumers when choosing a certain product (Klein et al., 2020; Wang et al., 2022). Therefore, the first hypothesis was formulated as follows:

H1: Price is the most important attribute for the perceived value.

To test the first hypothesis, relative importance was used. Relative importance analysis shows how consumers view the attribute's importance by looking into the marginal utility. The larger the marginal utility range, the more important that attribute is relative to others.

The material attribute also plays an important role in a consumer's evaluation of the environmental damage caused by the product, such as the inclusion of materials produced by activities that damage the environment or bad social responsibility (Klein et al., 2020; Scherer et al., 2018). Furthermore, the presence of an eco-label was also shown to have a significant effect on consumer preference in past research studies, as it provides credibility to the product that it was produced in a manner that does less damage to the environment (Rihn et al., 2019; Tan et al., 2019). However, eco-labels have been found to be consider of less importance than material attributes (Chekima et al., 2016). The second hypothesis was formulated as follows:

H2: Material is more important than an eco-label with regards to the perceived value.

A relative importance test was also conducted to test this hypothesis, similar to that done for the first hypothesis.

The third hypothesis revolves around the willingness to pay for shoes with environmentally friendly attributes. With regards to materials, consumers are willing to pay more for a product that contains more environmentally friendly materials (Carus et al., 2016). Furthermore, eco-labeling has shown to be one of the indicators of a consumer purchasing a product (Moon et al., 2002). Therefore, the hypothesis is stated as follows:

H3: People are willing to pay a premium price for products that provide a more environmentally friendly attribute.

To test this hypothesis, a willingness to pay analysis was conducted. The baseline values incorporated the least environmentally friendly attributes, such as no eco-label and the lowest percentage of bio-based plastic. A willingness to pay analysis was used to assess if consumers would pay more for products with a higher percentage of bio-based plastic and an eco-label. There are two types of eco-label, government and self-declared. In testing the hypothesis, the government eco-label was regarded as the more environmentally friendly label as it is more strictly regulated than the self-declared label.

Several environmental behaviors were also assessed in this research: green self-identity and the behaviors of reduce, reuse, and recycle. With regards to attribute importance, consumers with green behavior tend to choose attributes of products that have a better environmental impact (Brand and Rausch, 2021). On the other hand, consumers with less green behavior put

less importance on these environmental attributes and tend to focus more on price attributes (Brand and Rausch, 2021). Affecting this behavior in Indonesia is the fact that environmental awareness programs in Indonesia only have a short history (Desfandi et al., 2017). Younger Indonesian consumers are more likely to have been exposed to environmental programs, such as Adiwiyata, which only started to roll out in 2005, and the eco label program that began in 2014, than older consumers. Thus, the fourth hypothesis was formulated as follows:

H4: People with greener behavior value products with better environmental attributes more than consumers with less green behavior.

H5: Younger consumers perceive more value in sustainable material than older consumers.

To test these two hypotheses, segmentation analysis was used, in which the demographic variables were treated as the subject effect of the conjoint. A significant effect is evident in cases where the likelihood ratio shows that the subject effect significantly affects the conjoint attributes.

3. Methodology

3.1 Desk Research

The literature data gathering of this study was aimed at gaining insights on subjects relevant to bio-based plastic footwear. Sources used in this study include EUR library catalog, Jstor, ScienceDirect, Harvard Business Review, and Google Scholar. Another point for investigation in the literature review surrounded the topic of the shoe industry as knowledge regarding the industry can be leveraged. The data collection was for the purpose of obtaining information that could be analyzed to provide results that are reliable and relevant to the study.

3.2 Quantitative Research

The quantitative research employed in this study used a choice-based conjoint analysis survey. Through the survey platform Qualtrics, 200 responses were obtained and constituted the sample. Respondents of the survey were Indonesian consumers of the footwear industry. The survey was distributed to relatives and friends in Indonesia and the data were analyzed using the statistical software JMP by using several tests.

This section explains the analysis done in the research. First, an explanation of how the data was gathered is provided. Second, the method of analysis, which involved logistic regression,

willingness to pay analysis, segmentation analysis, and market simulation analysis, is explained.

3.2.1 Data Collection

The survey consisted of 3 parts. The first part was the collecting of the socio-demographic data of the respondents, which included: age, income, education, and gender. The second part of the survey collected data on the environmental behavior of the respondents. Four questions about the respondent's beliefs about their green self-identity, reduce, reuse, and recycling behavior were answered in the form of the Likert scale. The third part of this survey consisted of the choice-based conjoint experiment. Respondents were asked to choose their preferred shoes from two options given. Eight choice-based questions were asked of the respondents, an example of which is displayed in Figure 2.

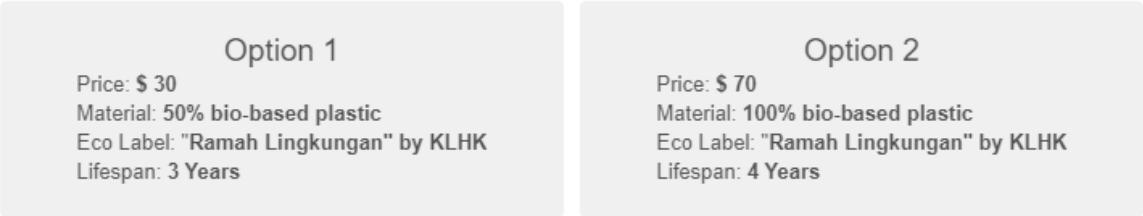

Figure 2. *Example of the Conjoint Choice Task*

The survey did not collect qualitative information but rather quantitative information, which enables conjoint analysis from which greater insights can be gained. Conjoint analysis provides the opportunity to analyze the willingness to pay of the respondents in the sample. Furthermore, it is less time-consuming in terms of obtaining and analyzing over 200 respondents than qualitative analysis is.

For the conjoint analysis, four attributes were used and each attribute had three levels. The dependent variable of the study is the utility value. The independent variables include the attributes researched, namely shoe material, price, eco-label, and the Lifespan of the shoes.

Attributes	Levels
Shoe Material	• 0% Bio-based Plastic • 50% Bio-based Plastic • 100% Bio-based Plastic
Price	• Rp 430.000 ($30) • Rp 720.000 ($50) • Rp 1.000.000 ($70)
Eco label	• No Label • Self-declared Eco label • "Ramah Lingkungan" by KLHK (Government)
Lifespan	• 3 Years • 4 Years • 5 years

Table 2. *Research Attributes and Levels*

- Shoe Material

Shoe material plays an important role in customer preference. Shoe material incorporates the environmental awareness of a person in their choice of material. This attribute is in line with the concern for the environmental damage that the most common shoe material, namely plastic, produces. For this attribute, the study examined consumers' material preferences by giving the choices of 0%, 50%, and 100% bio-based plastic. The more bio-based plastic used in a shoe, the less petrochemical plastic used. Therefore, it is assumed that the more bio-based plastic embedded in the shoe, the more environmentally friendly it is.

- Price

Price is an important attribute of this study as it depicts the amount of money consumers are willing to pay for a certain product. The levels of shoe prices are based on the average prices in the shoe industry in Indonesia (Antonio and Kusumastuti, 2019).

- Eco Label

This study includes the Eco label attribute to capture consumer preferences based on the presence of eco-labels on shoe purchases. Different pairs of shoes have different eco-labels embedded in them. Some shoes have an eco-label certified by the government, such as the "Ramah Lingkungan" label from the Ministry of Environment and Forestry of Indonesia, while some shoes have self-declared eco-labels that the company has attached. There are also companies that choose not to include any eco-label on their shoes. Therefore, this attribute provides a means to assess the importance of eco-labels in a shoe purchase.

- Lifespan

This attribute indicates how long the shoes usually last. It depicts the quality of a shoe, and whether it can last in the short term or the long term. It is assumed that the better the shoe

quality, the longer it will last. In this case, the study examined three levels of shoe lifespan duration: 3, 4, and 5 years of use.

The number of attributes and levels included in this research generates 81 different profiles. However, answering multiple questions that include 81 profiles would be exhausting, and the respondents would lose interest. However, through the use of orthogonal design, JMP can help identify which profiles should be selected to do the research effectively. As a result, sixteen profiles were selected and included within the eight questions in the survey.

3.2.2 Method of Analysis

Data was analyzed using binary logit regression. Binary logit regression has been used in this research as the regression predicts the probability based on two levels. Regression is suitable for this research as the respondents choose between two options for each choice task. The regression model of this research looks like:

$$U_{ij} = \beta_1 * Price + \beta_2 * Material + \beta_3 * Label_{Self-Declared} + \beta_4 * Label_{Government} + \beta_5 * Lifespan_{Years}$$

Choice = 1 if $U_{ij} > 0$

Where U_{ij} is the underlying utility of the consumer.

The conjoint analysis of this research was done using JMP 16 and SPSS with additional data reshaping using Microsoft Excel. A dummy variable was created as a label attribute because it was treated as a categorical variable. Price, material, and lifespan were treated as continuous variables. A likelihood ratio test was done to test the significance of the attributes. In this binary logistic regression, the estimated coefficient came as a result. The estimated coefficients were used as part-worth utility for further analysis, specifically to estimate the willingness to pay for each attribute and marginal effect tests.

The marginal effect test estimates the importance and range of the attributes. This analysis shows how important certain levels are within an attribute to the respondents. The analysis was done through the range of part-worth utility levels. To analyze importance, the marginal utility range was used, in which the larger the utility, the more important the attribute is relative to other attributes.

3.2.3 Willingness to Pay

Past studies have provided several methods of analysis of willingness to pay (Breidert et al., 2006). This study used a survey method to analyze willingness to pay. The survey method employed an indirect survey in the form of conjoint analysis. The part-worth utility derived from the conjoint analysis was used to formulate utility per price. The utility per price helps the calculation of WTP. The WTP studies the utility generated by customers based on the monetary price increase. For example, in the case of a shoe price increase of Rp100,000, the utility changes according to the amount that is utility per price. WTP analysis was done on the attribute levels based on the converted ratio of euro per utility. Thus, utility scores were able to be derived from each attribute level to be used in the WTP for the respective attribute levels.

3.2.4 Segmentation

This research also provides segmentation based on several demographic characteristics. The first part of the demography includes basic information, such as age, income, education, and gender. The next set of segmentation is based on four environmental behavior demographics: green self-identity, reduce, reuse, and recycling behaviors.

To measure segmentation, conjoint analysis with demographic information as its subject effect was implemented. This gave a likelihood ratio, with demographic as the subject effect, to show which demographics significantly affect the respondent's decision to choose a certain level in an attribute. Segmentation analysis digs deeper into measuring differences in consumer preferences within the demographic groups through utility profiler analysis.

Questions regarding demography were also included in the survey. The demographics chosen were age, gender, education level, and income level. The demographic questions were aimed at investigating whether there is a correlation between certain attributes' importance based on demographic indicators.

3.2.5 Market Simulation

Market simulation was analyzed in this study to provide realistic implementation based on the utility value. Market simulation helps develop product concepts that can be compared within a competitive market. Therefore, in market simulation, new products can be tested for market entry and analyzed for the likelihood of the consumer choosing that product.

In this study, the comparison was made of the market with and without new products. The analysis looked into the simulated market's average utility and average importance. Initially, three products were simulated within the market, based on the currently available products in the market. One additional product was added to the simulation. As a result, how a consumer would react to the new product introduced to the market could be seen, along with differences in average importance of the products.

4. Results

This chapter elaborates on the results of the conjoint analysis. First, an explanation regarding the sample is given to provide the sample's demographic characteristics. Second, the conjoint results are explained, including binary logistic regression, likelihood ratio test, marginal effect test, and willingness to pay analysis. The factor analysis done on the four pro-environmental questions is also outlined. After that, segmentation analysis was done to investigate the differences in consumer preferences based on demographic and environmental behavior characteristics. Lastly, market simulation was developed to assess the possibility of market competitiveness based on the sample.

4.1 Descriptive Analysis

The survey was filled in by 284 respondents with a completion rate of 91%. The first part of the survey concerned demographic information. Table 3 shows the demographic information of the sample population and the Indonesian demographic characteristics.

Characteristics		**(N=284)**	**Sample (%)**	**Indonesian Population (%)**	
Age group	18 - 24	94	33.1%		18.6%
	25 - 44	101	35.6%		49.8%
	over 45	89	31.3%		31.6%
Income Level	0 – 6,000,000	103	36.3%	First 20%	21.7%
	Rp 6,000,000 – 15,000,000	82	28.9%	Second 20%	44.9%
	Over 15,000,000	64	22.5%	Third 20%	7.1%
	Chose not to answer	35	12.3%	Fourth 20%	15.3%
				Fifth 20%	11.0%
Education level	Elementary School or lower	0	0.0%		36.8%
	Middle or High School	10	3.5%		52.5%
	University Degree	267	94.0%		8.3%
	Other	7	2.5%		2.5%
Gender	Male	164	57.7%		50.2%
	Female	120	42.3%		49.8%

Table 3. *Descriptive statistics of the sample and the Indonesian population (BPS & World Bank Databank)*

From the descriptive analysis of the sample as illustrated above, it is evident that the sample is not a representative of the Indonesian population. However, it is noticeable that the sample represents young educated urban Indonesian consumers. The Indonesian population's descriptive analysis data was obtained from the Indonesian Body of Statistics (BPS) and the World Bank's databank (Badan Pusat Statistik, 2021; World Bank Data, 2021). One important note is that the comparison of income levels provides different metrics as there is no available Indonesian income level metric that matched the research income level metric.

Through the data obtained from the second part of the survey, there are several insights regarding the respondent's pro-environment behavior. Four questions were delivered in this part: one question was regarding green self-identity and the three others were regarding environmental behavior (reduce, reuse, recycle). The answers to the questions were on Likert scale form, which was classified from scale 1 to 5 (1 = strongly disagree; 2 = disagree; 3 =neutral; 4 = agree; 5 = strongly agree). From those four questions, the means were calculated to create a single Pro-Environmental Behavior variable with means as the scores. The higher the respondent's answers, the higher and the more they embodied pro-environmental behavior. Most respondents considered themselves to have a high pro-environmental behavior, as 41% of the sample was in a scale of four and above, which indicated that most of the respondents embodied pro-environmental behavior. A consideration to create a single variable is based on factor analysis of the pro-environmental variables in question, which is available in section 4.7. Further detailed information regarding the pro-environmental behavior sample is available in appendix 3.

4.2 Conjoint Result

Conjoint analysis results can be divided into several parts that was employed to provide answers to the hypotheses. First, the regression results were explained in section 4.3, which became the basis of the analysis. Furthermore, the likelihood ratio was being used to check the significance of each attribute's effect on consumer preferences. To answer H1 and H2, the effect-marginal test was conducted to find the relative importance of each attribute. Subsequently, an analysis of willingness to pay was completed, in which the answer of H3 is found. Several analyses were done in answering H4 and H5, including segmentation analysis and reliability tests. Lastly, market simulation was also applied in this study to test the implementation of the conjoint results.

4.3 Binary Logistic Regression

In this section, the result of binary logistic regression was being assessed. Table 4 displays the estimated results generated by JMP 16 software.

Term	Coefficient	Std Error	Confidence Interval		Exp (Coefficient)	Size Effect
			Lower 95%	Upper 95%		
Price	-0,0368	0,0083	-0,0531	-0,0207	0,9638	-0,6094
Material	0,0166	0,0034	0,0099	0,0233	1,0167	0,6547
Label [Government Eco Label]	0,4786	0,0627	0,3565	0,6021	1,6138	0,3783
Label [Company Eco Label]	0,0753	0,0671	-0,0566	0,2063	1,0782	0,0595
Label [No Label]	-0,5539	0,0597	-0,6714	-0,4375	0,5747	-0,4379
Lifespan	0,5117	0,1073	0,3021	0,7224	1,6682	0,3931

Table 4. *Parameter Estimates. The intercept is set to zero. Material is measured in % of Bioplastic (1-100). Lifespan is measured in Years (2-5)*

In the regression, price, material, and lifespan were treated as a continuous variable, while label was treated as a categorical variable. Price negative coefficient (-0.03685) indicated that an increase in €1 decreased latent utility by -0.03685. Concerning material, the coefficient (0.01656) indicated that an increase of 1% of bio-based material used in a shoe increased the latent utility by 0.01656. Furthermore, label was considered a categorical variable, containing three coefficients of each level in the attribute. It also indicated that respondents derived the most utility from choosing shoes that have a government eco-label with (0.478582), followed by a company eco-label (0.075288), and respondents derived the least utility from choosing shoes with no eco-label (-0,55387). Lifespan coefficient indicated an increase of 1 year in a lifespan of a pair of shoes increases the utility by 0.511741.

Standardized coefficient is used to measure the size effect of each variable. Effect size is calculated to find the relative effect of different variables in the conjoint analysis. The calculation is done by multiplying the coefficient with the variable's standard deviation. This calculation result adjusts the standard deviation of the attributes to have an equal standard deviation. It is evident that the material attribute is the most important based on the size effect. A more detailed information regarding attribute importance is displayed in section 4.5. Therefore, the effect size shows the standardized effect of each variable on consumer preference in purchasing bio-based plastic footwear.

4.4 Likelihood Ratio Test

The likelihood ratio test was being used to calculate the significance of the attributes used in the conjoint analysis. The test showed the Chi-Square value and P-value of each attribute. Table 5 displays the likelihood ratio test result.

Source	L-R ChiSquare	DF	Prob>ChiSq	P-Value
Price	20.079	1	<.0001	0.00000
Material	24.093	1	<.0001	0.00000
Label	110.011	2	<.0001	0.00000
Lifespan	23.085	1	<.0001	0.00001

Table 5. *Likelihood ratio test*

The test showed that all attributes significantly affected the willingness to pay for bio-based footwear. The significance of the attribute was shown from the significance level below 0.05 or 5%. The attribute material and label significantly affected Indonesian consumers' willingness to pay for bio-based footwear. This may suggest that there is very strong evidence that label have a significant effect on consumer preference.

4.5 Effect Marginal Test

Effect marginal calculation showed the importance of each attribute relative to each other. To calculate the attribute importance range of the part-worth utility, the value difference between the highest and lowest utility value in a certain attribute was used. Furthermore, the utility range of one attribute was divided by the total range of all attributes to find the relative importance. The importance calculation is displayed in Table 6 below:

Attributes	Utility Range	Importance
Price	1.473997	27%
Material	1.655983	31%
Label	1.03245	19%
Lifespan	1.23479	23%

Table 6. *Effect marginal test*

The most important product attributes were material (31%) and price (27%) attributes. Respondents derived more values in the two most important attributes than the others. The third most important attribute was shoes' lifespan with 23% importance. Label was the least important attribute based on consumer preference. However, the importance level at 19% still substantially affected the consumer’s preference.

4.6 Willingness to pay

From the Euro-per utility ratio, derived from the price attribute, it is evident that one point utility is worth €27.14. On the other hand, a €1 price increase should result in the utility of 0.0368. Furthermore, the ratio can be used to calculate the willingness to pay for other attributes in the research. The calculation of the WTP of each level was based on the calculation of the difference of utility between the attribute level in question and the baseline value of that attribute. The utility difference was then multiplied by the price per utility ratio. Therefore, price change was generated from the baseline to the particular attribute level. To find the new price, the price change was summed with €30, which was the baseline price. The further calculation of willingness to pay was displayed in Table 8, with the base level being explained in Table 7.

	Base Value
Price	€ 30
Material	0% Bio-Based Material
Eco Label	No Eco Label
Lifespan	3 Years

Table 7. *WTP Base Value*

Factor	**Feature Setting**	**Utility Difference with Base Level**	**Price Change**	**New Price**
Material	50% Bio Based Plastic	0.827990	€22	€52
Material	100% Bio Based Plastic	1.655983	€45	€75
Label	Company Eco Label	0.629154	€17	€47
Label	Government Eco Label	1.032448	€28	€58
Lifespan	4	0.511738	€14	€44
Lifespan	5	1.023479	€28	€58

Table 8. *WTP of other levels*

From the WTP analysis, it is evident that the sample was willing to pay for footwear that provides a higher bio-based plastic percentage, attaches eco-label, and has a longer lifespan. The analysis shows a significant price increase in using more bio-based plastic material. Furthermore, regarding labels, respondents would be willing to pay more for footwear with a certified eco-label or even more for the government-regulated eco-label. Material and lifespan are treated as a continuous variable with the coefficient of 0,01656 and 0,51174, in which willingness-to-pay can be assessed in continuous manner. Regarding material, an 1% increase in bio-based plastic material led to the increase in willingness to pay by €0,4. On the other hand, one year increase in footwear lifespan increases the samples' willingness to pay by €13, 9.A more detailed calculation regarding willingness to pay is available in Appendix 3.

4.7 Factor Analysis

Factor analysis is used to analyze the correlation between several pro-environmental behavior variables. The analysis which was done through SPSS analyzed the correlation between 4 environmental behaviors of the respondents. The behaviors include green self-identity, reduce, reuse, and recycling behavior. Table 9 shows the results of factor analysis regarding pro-environmental behavior.

Component Matrix[a]	
	Component 1
PEB1 - Green Self Identity	0.762
PEB2 - Reduce Behavior	0.829
PEB3 - Reuse Behavior	0.619
PEB4 - Recycle Behavior	0.762

Table 9. *Factor analysis on the pro environmental behaviors*

The factor analysis shows that all 4 of the pro-environmental behavior variables are correlated. The analysis run on SPSS showed that the variables that have the matrix component presented scores above 0.5, which showed that all 4 of the variables belong to the same factor. Thus, a new variable that calculated the means of the four variables was created to analyze the factor scores.

A reliability test was done to analyze the consistency between the four variables being combined to create a single pro-environmental behavior variable. The variables included green self-identity, reduce, reuse, and recycling behavior. From the reliability test, it proved that the data in the four variables were consistently based on the Cronbach's alpha scores of 0.732 (see Appendix 6).

4.8 Segmentation

In examining the segmentation of the respondents, the subject effect was implemented in the conjoint analysis. A difference in segmentation would be shown in the likelihood ratio test and the joint factor test. The pro-environmental behavior factor analysis was applied as four questions define the environmental behavior of the respondents.

Table 11 displays the likelihood ratio test, which indicated that there was a difference in consumer's choice by consumer's pro-environmental behavior. This variable was created by calculating the means of 4 pro-environmental behavior of the respondents' green self-identity, reduce, reuse, and recycle behavior. It also proved that the difference in consumer choice is on

the choice of label attribute by looking at the significance value of PEB*Label (0.257), which was below 0.05. Another segmentation based on sets of demographic and other environmental behavior is available in Appendix 5.

Source	L-R ChiSquare	DF	Prob>ChiSq
Price	0.005	1	0.9432
Material	0.156	2	0.925
Label	0.758	2	0.6846
Lifespan	0.454	2	0.7967
PEB*Price	0.001	1	0.9733
PEB*Material	1.051	2	0.5912
PEB*Label	7.322	2	0.0257
PEB*Lifespan	0.705	2	0.7028

Table 11. *Likelihood ratio test with Pro-environmental Behavior subject effect*

Analyzing the difference in consumer preferences based on pro-environmental behavior investigates the utility gained in choosing a certain label. From Figure 2, it is evident that the respondents with the highest 20% percentile based on the pro-environmental behavior benefit larger utility in choosing government eco-label and self-declared eco-label compared to not attaching an eco-label label. On the other hand, respondents with the lowest 20% percentile of pro-environmental behavior benefit less utility from having a governmental eco-label.

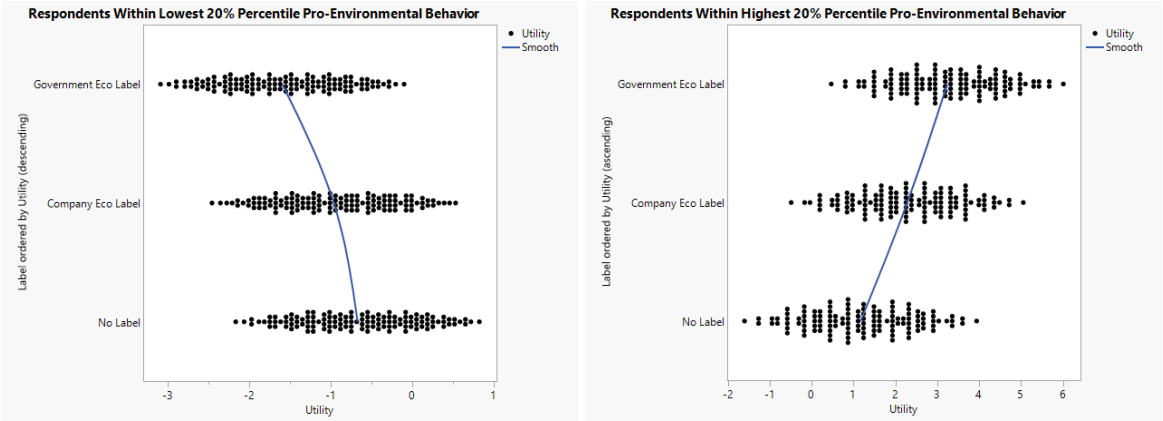

Figure 3. *Utility gain by respondents based on their pro environmental behavior*

Segmentation by the respondent's socio-demographic attributes was also done. However, no significant findings show consumer preference was influenced by age group, income, education, or gender. The analysis was also in the form of a likelihood ratio with age as the subject effect. Refer to Appendix 5 for more detailed information.

4.9 Market Simulation

Market simulation analysis of this research investigated how footwear companies could place their product in the current market of bio-based footwear. Initially, three products were put in place of the market simulation, which pictured the current available bio-based footwear. The current market of bio-based footwear in Indonesia was filled with lower prices ranging from €30 to €50, which was evident from the products sold by footwear manufacturers such as Bro.do, PijakBumi, and Sage Footwear. Suppose a company tried to introduce another product to the market as a high-end alternative to the available products. The difference in market share was the main difference needed to be investigated. However, it is important to note the analysis was based on the data gathered in the sample, and the data was not representative of the actual market in Indonesia. The sample was relevant to young educated urban consumers of Indonesia.

The products in the market simulation are available on Table 12.

	Price	Material	Eco Label	Lifespan
Shoe 1	€30	0%	Company Eco Label	5
Shoe 2	€50	50%	Company Eco Label	4
Shoe 3	€30	50%	No Eco Label	3
New Shoe	€70	100%	Government Eco Label	4

Table 12. *Product in Market Simulation with Attributes*

A shift in market share is evident before and after the new product introduction, as drawn in Table 13. The market share was formulated by using utility as the indicator, in which how large each utility was compared to each other. The form of the calculation was each shoe's utility divided by the total sum of the utility of all shoes in the market. Initially, shoe number 1 had the biggest market share with 46% share, followed by shoe number 2 with 33%. However, after introducing the new shoe, the market share was based on the utility of the shifts. The new pair of shoes became the largest market share, with 1% difference with shoe number 1 which came the second. Shoe number 2 became the third in the market, and shoe number 3 was the fourth. Therefore, the development of the new shoes could compete in the current bio-based footwear market that targets young educated urban Indonesian consumers.

	Utility	Initial Market Share	New Market Share
Product 1	1.528496	46%	31%
Product 2	1.107749	33%	22%
Product 3	0.70385	21%	14%
New Product	1.602038		32%

Table 13. *Market Share Difference Based on Product Utility*

4.10 Acceptance or Refutation of Hypothesis

The first and second hypotheses revolved around calculating relative importance in the analysis. The analysis of relative importance based on the effect marginal test is available in section 4.5, while the hypothesis is analyzed in this part.

H1: price is the most important attribute for the perceived value.

Based on Table 6 regarding analysis of relative importance, price is not the most important attribute. Price attribute stands as the second most important attribute for consumers of bio-based footwear to look at. Therefore, this hypothesis is refuted.

H2: material is more important than eco label with regards to the perceived value.

Looking back at the analysis of relative importance, it is evident that the material attribute is the most important. In comparison, the eco-label stands as the least important attribute. This indicates that consumers put more emphasis on choosing footwear based on the material choice rather than eco-label. Thus, this hypothesis is accepted.

Willingness to pay provides insights into answering the third hypothesis. Tables 7 and 8 provide the basis for answering the third hypothesis. Which is stated as follows:

H3: people are willing to pay a more premium price for products that provides a more environmentally friendly attribute.

The baseline attributes of the analysis host the least environmentally friendly attributes, such as 0% bio-based material and no eco-label. Therefore, attributes that are analyzed in Table 8 shoes attributes that are more environmentally friendly. Consumers were willing to pay more for shoes with more bio-based plastic material, such as 50% and 100% bio-based plastic, rather than 0%. On the other hand, consumers were also willing to pay more for shoes with better environmentally friendly labels, such as those found in the form of governmental and self-declared company eco-labels. Therefore, it indicates that consumers are willing to pay a premium for products with better environmentally friendly attributes, and this hypothesis is accepted.

Segmentation becomes the pinpoint of the fourth and fifth hypotheses, where its analysis is explained in sections 4.7 and 4.8. In this section, the fourth and fifth hypotheses are analyzed and answered.

H4: people with greener behavior would be value more for products with better environmental attributes than consumers with less green behavior.

As seen from the segmentation analysis, it is evident that consumers with higher pro-environmental behavior prefer a product with a better environmental label. The utility gained from choosing a better environmental label by consumers with high pro-environmental behavior is greater than the utility gained by consumers with low pro-environmental behavior. This indicates that consumers with greener behavior will be more likely to choose footwear with more environmentally friendly attributes. Therefore, this hypothesis is accepted.

H5: younger consumers perceive more value towards more sustainable material than older consumer.

The segmentation analysis result shows no difference in consumer preference by age. The analysis is done using the regression with age group as its subject effect. The result shows that there is no difference in consumer preference by age. Therefore, the fifth hypothesis is refuted.

5. Conclusion

This research studies Indonesian customers' willingness to pay for bio-based footwear. The analysis was examined using a choice-based conjoint analysis using binary logistic regression and it was directed to answer the central research question guided by the sub-research question of the research.

Through the conjoint analysis, results on relative importance were gained to help answer the research questions. Attributes that were essential to Indonesian consumers for bio-based footwear were material and price (see Table 6). These findings are in line with previous research proven that consumers put more focus on environmentally friendly attributes in choosing bio-based footwear while still emphasizing how much it would cost them to purchase a certain pair of shoes (Klein et al., 2020; Scherer et al., 2018; Wang et al., 2022).

The analysis continued by measuring Indonesian consumers' willingness to pay for bio-based footwear. This analysis measured consumers' willingness to pay for shoes with a certain attribute compared to the baseline attributes. Indonesian consumers were willing to pay more for shoes with improved environmentally friendly attributes, such as better regulated eco-label and more percentage bio-based plastic material – in line with literature review findings regarding surcharges analysis of outdoor apparel in Germany (Brand and Rausch, 2021). On

the other hand, Indonesian consumers were also willing to pay more for shoes with a longer lifespan.

Segmentation analysis helped to understand more about consumer preferences based on certain demographic. This analysis helped in answering the sub-research questions by discussing H4 and H5. The sub-research questions are:

- To what extent are the differences in perceived value based on age, income level, education level, and gender?
- Does a consumer's green self-identity and behaviors to reduce, reuse, and recycle affect their perceived value?

Evidently, consumers that embodied green behavior, such as reducing, reusing, and recycling, tend to choose products with better eco-label (see Sections 4.7 and 4.8). The result confirmed that green consumers tend to choose products that embody better environmental attributes than less green consumers, more specifically in choosing better-regulated eco-label (Brand and Rausch, 2021; Bratt et al., 2011; Moon et al., 2002; Nadlifatin et al., 2016).

Previous research suggested that younger women would have environmental awareness, which led to choosing a product with better environmental attributes (Xiao and Dunlap, 2007). No evidence was found supporting to a difference in consumer preference based on socio-demographics, whether in terms of gender, age, income level, or education level (see Appendix 5). One reason that could explain this difference in results was that Indonesian are less educated in terms of environmental awareness, which leads to the result that this research showed no significant difference in consumer preference based on socio-demographics.

The central question is stated as follows:

- How does price, material, eco label, and lifespan influence the willingness to pay for bio-based footwear in the Indonesian market?

In answering the central research question, willingness to pay analysis is investigated once more. Firstly, the price effect on willingness to pay is explained as in the more expensive the product, the less willing consumers were to buy, which is in line with previous research (see appendix 4) (Scherer et al., 2018). However, it is not in line with previous research in which price is not the most important attribute. One reason for this result is that the survey sample in this research consists mostly of respondents with higher education (see Appendix 7), which could undermine the importance of the price attribute (Brand and Rausch, 2021). Second,

Indonesian consumers were willing to pay more for footwear with a higher percentage of bio-based plastic embedded in the shoes. Material was regarded as the most important attribute in this research, which companies can emphasize to attract more consumers. Third, Indonesian consumer was willing to pay more for footwear that provided better eco-label, such as governmental and self-declared company eco-label. Providing eco-label in the footwear further emphasized the environmental impact the product had. With a regulated label, both government and self-declared company eco label consumers were given the guarantee that the product provides less environmental harm. Fourth, consumers were willing to pay more for a longer shoe lifespan. This indicated that consumers ere putting importance on the quality of the shoe. Lifespan as regarded as the attribute representing quality; the longer it lasts, the better the quality.

Recommendation to Footwear Industry

Recommendations are proposed toward the bio-based footwear industry. The first one is to emphasize developing the environmental attributes of shoes. This recommendation is in line with the research result in which Indonesian consumers highly value the environmental friendliness of footwear that they use, such as by using more environmentally friendly materials.

The second recommendation is to not forget the eco-label certification. Even though the eco-label attribute is the least important in choosing bio-based footwear, the eco-label assures the consumers regarding the environmental impact of the product. Therefore, choosing to put either a company or government eco-label is strongly recommended.

The third recommendation is trying to find a balanced strategy for lifespan. It is evident from the research that consumers put less emphasis on choosing bio-based footwear based on their lifespan compared to the price and material attributes. However, the lifespan attribute does not go far off compared in terms of importance compared to more important attributes. Therefore, balancing the lifespan is the best recommendation as the higher the lifespan can cost extra on product development. At the same time, a lifespan that is too low can generate a significant loss in the utility.

The fourth recommendation is to dare offering a different pricing strategy. As seen from the market simulation, it is apparent that even putting a high price in line while using environmentally friendly attributes also results in a competitive product in the market filled

with low price products. Therefore, companies should not be afraid to implement a radical pricing strategy.

Limitation

The study shed light on limitations to be evaluated. Firstly, the respondent's sample consists mostly of respondents with higher education. As explained in Table 3, the research respondents mostly comprised people studying for a bachelor’s degree or higher. It is also evident from Appendix 4 that the older respondents provided more mixed answers regarding price attributes. Therefore, lead to price attribute does not significantly affect consumer preference for bio-based footwear. Secondly, the regression model does not implement a random effects model. Providing conjoint analysis with random effects can bolster the analysis to control unobservable heterogeneity (Bell et al., 2019). Third, this analysis is done by using orthogonal design, which eliminates the possibility to run the regression model with interaction effect. Regression with interaction effect will provide more understanding in the relationship between variables.

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Appendices

Appendix 1

The survey is done in Indonesian, however, for easier understanding it is translated to English in this section.

Conjoint Analysis

Survey Flow

Standard: Block Intro (1 Question)
Standard: Demographic Block (4 Questions)
Standard: Block PEBT (4 Questions)
Standard: Familiarity Eco Label (1 Question)
Standard: Block Intro Choice Task (1 Question)

BlockRandomizer: 8 -

- **Standard: Choice Task 1 (2 Questions)**
- **Block: Choice Task 2 (2 Questions)**
- **Standard: Choice Task 3 (2 Questions)**
- **Standard: Choice Task 4 (2 Questions)**
- **Standard: Choice Task 5 (2 Questions)**
- **Standard: Choice Task 6 (2 Questions)**
- **Standard: Choice Task 7 (2 Questions)**
- **Standard: Choice Task 8 (2 Questions)**

Standard: Survey Question (2 Questions)

Page Break

Start of Block: Block Intro

Into and consensus Thank you for helping us by taking part in this research. I, Farhansyah Senoaji Pramana, am a student from Erasmus University Rotterdam who conducts research on Indonesian preferences for bio-plastic-based shoes. All data collected in this study is for research purposes only. Participation will take between 6 and 8 minutes. This survey can be completed via a laptop or mobile phone.

RISK: There are no significant risks associated with this online study.

PARTICIPATION: Your participation is voluntary. You can stop participating at any time by closing the browser window to withdraw from the study. Unresolved data will not be analyzed.

CONFIDENTIALITY: Your feedback will be kept anonymous. Your personally identifiable information will not be accessed in this survey. Any reports and presentations on the findings of this study will not include any information that could identify you.

Click the button below to continue.

- ○ I **agree** to take part in this survey (1)

End of Block: Block Intro

Start of Block: Demographic Block

Age How old are you?

- ○ Under 18 (1)
- ○ 18 - 24 (8)
- ○ 25 - 34 (2)
- ○ 35 - 44 (3)
- ○ 45 - 54 (4)
- ○ 55 - 64 (5)
- ○ Over 65 (6)

Income What is your income level?

- ○ Under Rp 2.000.000 (1)
- ○ Rp 2.000.000 - Rp 6.000.000 (2)
- ○ Rp 6.000.000 - Rp 10.000.000 (3)
- ○ Rp 10.000.000 - 15.000.000 (4)
- ○ Over Rp 15.000.000 (5)
- ○ Choose not to answer (6)

Education What is your education level? (Education that you have been / are currently taking)

- ○ Elementary School (1)
- ○ Middle School (2)
- ○ High School (3)
- ○ Bachelor's Degree (4)
- ○ Master's Degree (5)
- ○ Doctoral Degree (6)
- ○ Others (7)

Gender What is your gender?

- ○ Men (1)
- ○ Women (2)
- ○ Others (3)

End of Block: Demographic Block

Start of Block: Block PEBT

PEBT1 Green Self ID I think of myself as a consumer who cares about the impact the product or service I buy has on the environment

- ○ Strongly disagree (1)
- ○ Somewhat disagree (2)
- ○ Neither agree nor disagree (3)
- ○ Somewhat agree (4)
- ○ Strongly agree (5)

PEBT2 Reduce I stay away from items that contain materials that are not environmentally friendly (such as plastic and synthetic rubber)

- ○ Strongly disagree (1)
- ○ Somewhat disagree (2)
- ○ Neither agree nor disagree (3)
- ○ Somewhat agree (4)
- ○ Strongly agree (5)

PEBT3 Reuse I'm always looking for ways to reuse the products I own

- ○ Strongly disagree (1)
- ○ Somewhat disagree (2)
- ○ Neither agree nor disagree (3)
- ○ Somewhat agree (4)
- ○ Strongly agree (5)

PEBT4 Recycle I always sort the trash with the aim of recycling the trash that I make

- Strongly disagree (1)
- Somewhat disagree (2)
- Neither agree nor disagree (3)
- Somewhat agree (4)
- Strongly agree (5)

End of Block: Block PEBT

Start of Block: Familiarity Eco Label

FLE Are you familiar with the Eco Label in Indonesia?

- Yes (1)
- No (2)

End of Block: Familiarity Eco Label

Start of Block: Block Intro Choice Task

Intro Choice Task Now we will enter the conjoint experiment stage.

Imagine that you are shopping in a store to buy a pair of shoes. In each of these survey questions, you will be asked to choose a pair of shoes from the two available options. Please choose the shoes you like. The choice of shoes will be different for each question, for a total of 8 questions.

The difference between the two pairs of shoes is only based on the characteristics shown. Please assume that differences beyond the indicated characteristics are the same in all respects. The characteristics of the shoe include:

Price - The price of the shoes will range from IDR 430,000 to IDR 1,000,000.
Materials - From the choice of materials there are 0%, 50%, or 100% Bio based plastic.
Eco Label - Shoes can have an eco label "Environmentally Friendly" from the Ministry of Environment and Forestry (KLHK); The Company's self-declared "Eco" label; or do not include an eco label.
Lifespan - Can be used for 3, 4, or 5 years.

End of Block: Block Intro Choice Task

Start of Block: Choice Task 1

Q1 Which shoes will you choose?

○ Option 1 Price: **Rp 430.000** Material: **50% bio-based plastic** Eco Label: "**Ramah Lingkungan" From KLHK** Lifespan: **3 Years** (1)

○ Option 2 Price: **Rp 1.000.000** Material: **100% bio-based plastic** Eco Label: "**Ramah Lingkungan" From KLHK** Lifespan: **4 Years** (2)

Q1b Timing
First Click (1)
Last Click (2)
Page Submit (3)
Click Count (4)

End of Block: Choice Task 1

Start of Block: Choice Task 2

Q2 Which shoes will you choose?

○ Option 1 Price: **Rp 430.000** Material: **50% bio-based plastic** Eco Label: **"Eco" Company Declared** Lifespan: **3 Years** (1)

○ Option 2 Price: **Rp 720.000** Material: **0% bio-based plastic** Eco Label: **No Label** Lifespan: **5 Years** (2)

Q2b Timing
First Click (1)
Last Click (2)
Page Submit (3)
Click Count (4)

End of Block: Choice Task 2

Start of Block: Choice Task 3

Q3 Which shoes will you choose?

○ Option 1 Price: **Rp 720.000** Material: **100% bio-based plastic** Eco Label: "**Ramah Lingkungan" From KLHK** Lifespan: **3 Years** (1)

○ Option 2 Price: **Rp 1.000.000** Material: **100% bio-based plastic** Eco Label: **No Label** Lifespan: **5 Years** (2)

Q3b Timing
First Click (1)
Last Click (2)
Page Submit (3)
Click Count (4)

End of Block: Choice Task 3

Start of Block: Choice Task 4

Q4 Which shoes will you choose?

○ Option 1 Price: **Rp 1.000.000** Material: **50% bio-based plastic** Eco Label: "**Ramah Lingkungan" From KLHK** Lifespan: **3 Years** (1)

○ Option 2 Price: **Rp 720.000** Material: **0% bio-based plastic** Eco Label: **"Eco" Company Declared** Lifespan: **3 Years** (2)

Q4b Timing
First Click (1)
Last Click (2)
Page Submit (3)
Click Count (4)

End of Block: Choice Task 4

Start of Block: Choice Task 5

Q5 Which shoes will you choose?

○ Option 1 Price: **Rp 430.000** Material: **0% bio-based plastic** Eco Label: **"Eco" Company Declared** Lifespan: **4 Years** (1)

○ Option 2 Price: **Rp. 1.000.000** Material: **100% bio-based plastic** Eco Label: **No Label** Lifespan: **3 Years** (2)

Q5b Timing
First Click (1)
Last Click (2)
Page Submit (3)
Click Count (4)

End of Block: Choice Task 5

Start of Block: Choice Task 6

Q6 Which shoes will you choose?

○ Option 1 Price: **Rp 720.000** Material: **50% bio-based plastic** Eco Label: **"Eco" Company Declared** Lifespan: **5 Years** (1)

○ Option 2 Price: **Rp 430.000** Material: **0% bio-based plastic** Eco Label: **No Label** Lifespan: **4 Years** (2)

Q6b Timing
First Click (1)
Last Click (2)
Page Submit (3)
Click Count (4)

End of Block: Choice Task 6

Start of Block: Choice Task 7

Q7 Which shoes will you choose?

○ Option 1 Price: **Rp 1.000.000** Material: **50% bio-based plastic** Eco Label: **No Label** Lifespan: **4 Years** (1)

○ Option 2 Price: **Rp 430.000** Material: **0% bio-based plastic** Eco Label: **"Eco" Company Declared** Lifespan: **3 Years** (2)

Q7b Timing
First Click (1)
Last Click (2)
Page Submit (3)
Click Count (4)

End of Block: Choice Task 7

Start of Block: Choice Task 8

Q8 Which shoes will you choose?

○ Option 1 Price: **Rp 720.000** Material: **50% bio-based plastic** Eco Label: **"Eco" Company Declared** Lifespan: **4 Years** (1)

○ Option 2 Price: **Rp 1.000.000** Material: **100% bio-based plastic** Eco Label: "**Ramah Lingkungan" From KLHK** Lifespan: **3 Years** (2)

Q8b Timing
First Click (1)
Last Click (2)
Page Submit (3)
Click Count (4)

End of Block: Choice Task 8

Start of Block: Survey Question

Comments Do you have any comments regarding this survey?
_____

Clear Is the content presented in this survey clear?

- ○ Yes (1)
- ○ No (2)

End of Block: Survey Question

Appendix 2

Here below the link of the data is presented:

https://docs.google.com/spreadsheets/d/e/2PACX-1vS8CFH8ugKpM0jWtjcTpOud0OFmvjJ2SPPUdg4ys1PalC-B2sQgs2tCtSEeL4VQiHtq6kpbODJZDT0U/pub?output=xlsx

the numbers of next to the answers in appendix 1 corresponds with the numerical data on appendix 2

Appendix 3

Utility/Price Ratio

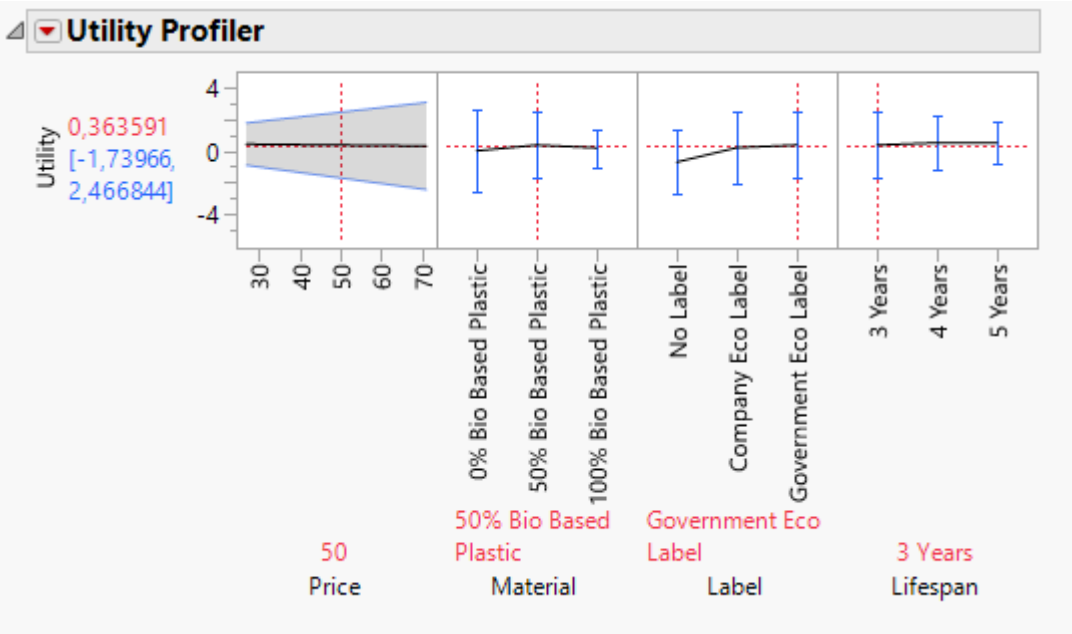
Utility		Price
0.0368	€	1.00
1	€	27.14

Factor	Feature Setting	Utility Difference with Base Level	Calculation	Price Change	New Price
Material	50% Bio Based Plastic	0.827990	0.82799*27,14	22	52

Material	100% Bio Based Plastic	1.655983	1.655983*27,14	45	75
Label	Company Eco Label	0.629154	0.629154*27,14	17	47
Label	Government Eco Label	1.032448	1.032448*27,14	28	58
Lifespan	4	0.511738	0.511738*27,14	14	44
Lifespan	5	1.023479	1.023479*27,14	28	58

*Calculation: (attribute level utility – baseline utility) * Euro per Utility ratio

Appendix 4



Appendix 5

Segmentation - Age

Source	L-R ChiSquare	DF	Prob>ChiSq
Price	4.62	1	0.0316
Material	4.503	1	0.0338
Label	17.204	2	0.0002
Lifespan	7.369	1	0.0066
Age*Price	2.808	5	0.7295
Age*Material	1.442	5	0.9196
Age*Label	5.643	10	0.8443
Age*Lifespan	4.063	5	0.5404

Segmentation - Income

Source	L-R ChiSquare	DF	Prob>ChiSq
Price	5.435	1	0.0197
Material	4.806	1	0.0284
Label	4.512	2	0.1048
Lifespan	2.092	1	0.1481

Income*Price	2.281	5	0.809
Income*Material	3.755	5	0.5852
Income*Label	5.007	10	0.8907
Income*Lifespan	2.106	5	0.8343

Segmentation -Education

Source	L-R ChiSquare	DF	Prob>ChiSq
Price	2.631	1	0.1048
Material	2.517	1	0.1126
Label	1.438	2	0.4873
Lifespan	2.661	1	0.1029
Education*Price	2.929	5	0.711
Education*Material	3.345	5	0.647
Education*Label	7.386	10	0.6886
Education*Lifespan	2.831	5	0.726

Segmentation - Gender

Source	L-R ChiSquare	DF	Prob>ChiSq
Price	20.522	1	<0.0001
Material	24.486	1	<0.0001
Label	106.708	2	<0.0001
Lifespan	23.965	1	<0.0001
Gender*Price	0.428	1	0.5128
Gender*Material	0.371	1	0.5424
Gender*Label	0.487	2	0.7839
Gender*Lifespan	0.929	1	0.3351

Segmentation - Pro-Environmental Behavior

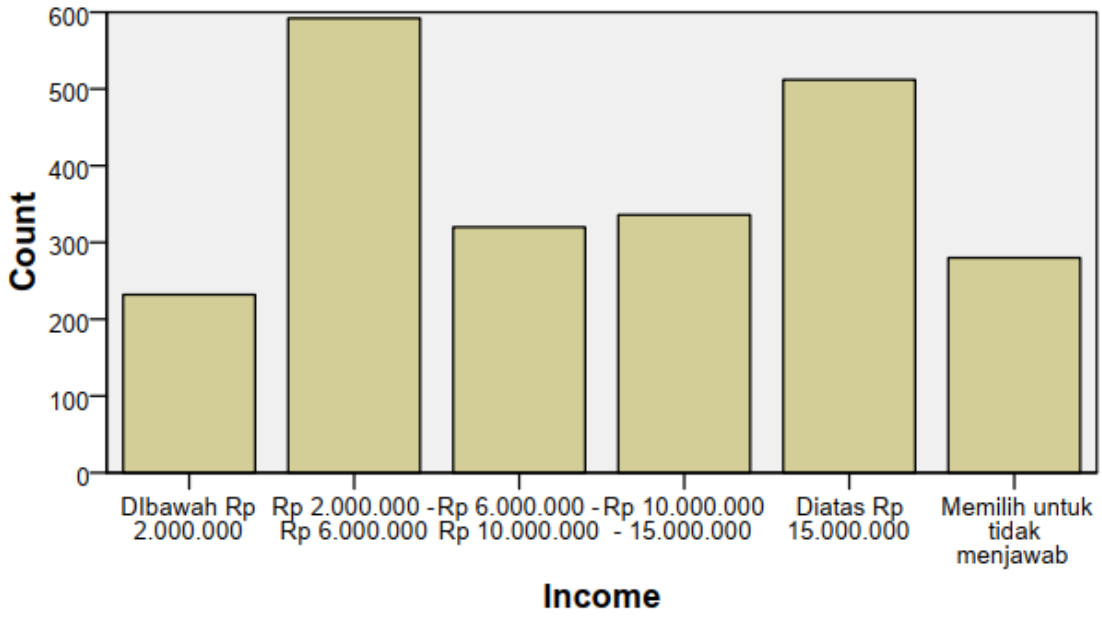
Source	L-R ChiSquare	DF	Prob>ChiSq
Price	0.933	1	0.3341
Material	0.369	1	0.5438
Label	7.364	2	0.0252
Lifespan	0.189	1	0.6636
PEB*Price	0.036	1	0.8498
PEB*Material	2.158	1	0.1419
PEB*Label	20.286	2	<0.0001
PEB*Lifespan	0.157	1	0.6922

Appendix 6

Reliability Test Pro-Environmental Behavior variables

Reliability Statistics	
Cronbach's Alpha	**N of Items**
0,732	4

Appendix 7



Appendix 8