Relative willingness to pay for environmentally friendly products and its relation with eco-certification

		
“White Paper”	**“Single use camera”**	**“Toner cartridge”**
 		
		
“Cell phone”	**“Printer”**	**“Retreaded tire”**

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Summary

This research investigated the relationship between eco-certification and the willingness to pay (WTP) for environmentally friendly branded products. The research was originated in Canada, where Essoussi and Linton (2010) compared products with an recycled component and tested what the impact was for different product groups on consumers' WTP. This research is an important part of a widely international investigation to environmentally friendly products. The main reason for it is that there is a significant increase of interest in natural environment because legislation in many countries aims at diverting disposed product from waste dumps to consumers.

The main aim of this research was to see if an interest in environmentally friendly products concerns appears to lead to the feeling that environmental certification is important. This was done by asking respondents the maximum price they would pay for a branded and recycled products. The same question was asked about branded and recycled products with an eco-certificate, so that those two variables can be compared.

230 students from the University of Twente were asked to fill in a questionnaire about environmentally friendly products. The participant were first year bachelor students from four different bachelor programs: Business Administration, International Business Administration, Civil Engineering and Industrial Design. The surveys were conducted in January and February 2011.

Results indicated that people are WTP more for branded and recycled products with an eco-certificate vs. non-certificated branded and recycled products. This counts for five of the six product groups. Only for Xerox white paper, respondents would not pay a price premium for an eco-certificate. Another result, which is similar to the study of Essoussi and Linton (2010), is that the consumers' WTP price premium for recycled products with an eco-certificate is product specific. Also the level of functional risk of recycled products with an eco-certificate has statistically proven that it is of influence on WTP. This means that products perceived with a low level of risk, like for example white paper (relatively low cost, no harm for the customer) are statistically different compared to products containing a high level of risk, like for example a car tire.

This project has taken an initial step to see if environmental interest leads to the feeling that environmental certification is important. It can be concluded that eco-certification plays a significant role on the six tested product groups. Still, the main reasons or argumentation for buying eco-certificated products over regular recycled products needs to be further investigated, not only by asking the respondents the maximum price premium they want to pay, but also look for motivation why they want to pay more for a certificated product. Also psychological related items needs to be further understand, and at the same time companies must be convinced what kind of contribution and advantage eco-certification can produce towards environmentally friendly products.

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Preface

It all started after the summer in 2008. At that point I was proudly graduated for my bachelor Marketing Management at Saxion Hogeschool of Enschede. The first questions arises quickly after graduation, what to do in the future, go further studying or to find a job?

The answer of that question was quickly found, in the fall of 2008 I started with the pre-master program of the Master Business Administration. Quickly after the completion of the pre-master I started with the Master courses. Throughout my career at the University of Twente I found that I had interests in multiple and diverse subjects, like e.g. Internet marketing, service marketing, organizational behavior, product management.

In searching an assignment for my thesis, I let my eye fall on the assignment on willingness to pay for environmentally friendly products. There were two points in this assignment what really attracted my attention. First, willingness to pay refers to the behavior of customers. What are customers willing to pay? What are the decision criteria customers use in their buying decision? These marketing related questions are very interesting for my marketing management background perspective. The second point of interest is that I got the opportunity to take an in-depth analysis about six different interesting product groups.

During thesis writing, I had an inconvenient break. In the spring I got ill, and after some medical investigations the doctor diagnosed that I was suffering from mono ("Kissing Disease"). This period was very difficult for me, for periods over months I felt tired, exhausted and my battery was very low.

I want to especially thank Professor Rainer Harms and Professor Linton for supporting me in this difficult period. I also want to thank them greatly for giving me the opportunity to participate in an international committee which investigated the willingness to pay for environmentally friendly products. And finally I want also thank them in increasing my academic skills, especially with the data analysis and writing skills.

Finally, I also want to thank family and friends, and especially my parents, for giving me the opportunity to study and to help me were possible.

Raalte, December 19th 2011

Peter Freriks

I. Introduction

This project is executed in order to complete the master thesis of Business Administration. The assignment is administrated from the Netherlands Institute for Knowledge Intensive Entrepreneurship. The assignment is set up in cooperation with the University of Ottawa of Canada, in which the original subject has been tested and executed. The thesis presents an insight into the willingness to pay (WTP) concept for environmentally friendly products, and its relationship with eco-certification.

First, the reason for the start of the project will be described, followed by the problem statement and the research objective. Then, a separated chapter will be presented towards WTP and eco-certification theory. The next chapter contains the research strategy, which will be followed by the data analysis and results. Finally, conclusions and recommendations will be presented, next to the discussion and the relevance for further research.

I. Reason for the start of the project

Earlier research presented an insight at WTP technique for products, which resulted in an study in Canada, about WTP in relation to environmentally friendly products. Two professors of the University of Ottawa developed a paper for the Journal of Consumer Marketing, in which the WTP in relation tom environmentally friendly products is discussed into detail (Essoussi and Linton, 2010).

The main objective of the Canadian study was to create an understanding of WTP for products with recycled or reused content. This because due to legislation, many countries aims at diverting disposed products from waste dump to customers (Essoussi and Linton, 2010).

WTP was studied for seven different product categories, in which 49 graduated students in Canada cooperated at the research. An survey with questions related to environmental interest and WTP was developed. Students volunteers from college classes of three different graduate programs (Environmental Economics, Business Administration and Environmental Law) were asked to fill in a questionnaire about environmentally friendly products.

An important finding in the Canadian study was that perceived functional risk is an important determinant of the price that consumers are prepared to pay for products with recycled or reused content (Essoussi and Linton, 2010).

The next step was to see whether the Canadian study can be generalized into other countries all over the world. This in other to further understand WTP for products with recycled or reused content. As a result, this thesis will be presented in which WTP is tested in the Netherlands.

II. Problem statement

In order to see whether different variables influences WTP, this thesis aim to understand the relationship between WTP and eco-certification. The main idea behind this concept is that consumers pertaining environmental interest may be sensitive for certificated products, and are prepared to pay more for these products.

For companies, this concept can be of important added value. If companies can be convinced that using eco-certification on recycled products increases WTP for customers positively, and this can be proven based on in depth-analysis, a win-win situation can be created.

In order to test the relationship between WTP for environmentally friendly products and products containing eco-certification, two specific questions were added next to the already existing questionnaire from the Canadian study (See appendix A).

In the first additional question, the same WTP technique is used as described in the Canadian study, only this time the WTP for eco-certificated branded products is asked. In this way it is possible to compare eco-certificated vs. non certificated products.

The second additional question, the importance of eco-certification in relation to recycled products is asked for the respondents. In this way it is possible to measure whether eco-certification plays a role in WTP for consumers, and that it is valid that recycled products should have an eco-certificate.

III. Research objective and research question

In order to analyze the relationship between WTP and eco-certification, the main research objective is to analyze whether an interest in environmental concerns appears to lead to the feeling that environmental certification is important. This will be measured by comparing the WTP for environmentally eco-certificated product vs. non certificated products. More detailed information can be found in the research strategy.

Based on the main objective, the following research question is formulated:

Does eco-certification increase WTP for environmentally friendly products?

To answer the research question, several analysis will be held based on the questionnaire as discussed in the problem statement. First, it is important to conceptualize a theoretical perspective towards WTP, certification and its relation, what will be discussed in the next chapter.

The third chapter contains of the followed research strategy in order to answer the main research question. The analysis and results will be discussed in chapter four. In chapter five, the discussions and conclusions will be presented.

II. Theoretical Perspective

This chapter provides insight into the theory of the thesis. The main entry point is to conceptualize the most important variables of this thesis, namely WTP and eco-certification of products. Conceptualization refers to the process of specifying the meaning of concepts in a precise way (Babbie, 2004). This will be done in the form of a theoretical perspective towards WTP and eco-certification in three steps.

First, it is important to employ an measurement technique to identify WTP. This will be done by analyzing the discussion that has been originated in earlier research on the validation of WTP.

The second step presents the relationship between the variables WTP and eco-certification on products. This will be the main entry point for this thesis. It will be conceptualized what direction and influence the relation is between the two variables WTP and eco-certification. This in order to present a theoretical insight into the main objective of this research, to see whether environmental certification is important for WTP for customers.

The theoretical perspective will be concluded by presenting the formulated hypothesis. This will be the starting point for determining the main research strategy and the data analysis.

I. WTP

First, it is important to find a definition for WTP. Then the relevance of WTP is presented for a theoretical and practical context.

WTP can be defined as following: “WTP is the maximum amount of money a customer is willing to spend for a product or a service” (O’ Brien and Viramontes, 1994). These authors studied the construct validity and test-retest reliability of WTP as a measure of health state preferences in a survey. Respondents were asked how much their WTP was for a hypothetical intervention offering 99% chance of healthy lung functioning and 1% chance of a death. WTP was elicited by a simple bidding game, were the respondents were randomly assigned to one of the five starting bids varying from $10,- till $100,-. O’ Brien and Viramontes (1994) used a bidding game as an measure to understand WTP, since this way it only requires yes or no answers which has more market realism than single open-ended questions asking respondents maximum WTP. However, starting-point bias may occur since the final bid is not independent of the first bid.

The idea of starting a bidding game (Viramontes, 1994) and see how much the maximum WTP is in contrary thoughts with Schadke & Payne (1994). Schadke & Payne (1994) analyzed what a respondent is thinking answering a WTP question in a contingent valuation, using a “think aloud” technique from psychology protocol analysis. An important conclusion of their analysis was that respondents must construct their responses at the time they are asked an elicitation question, rather than retrieve a previous formed value. So basically it is important that WTP questions are rather open for respondents to fill in their own observed value.

As discussed, Schadke & Payne (1994) used a contingent valuation method in order to decide WTP. Asking respondents' WTP for a product may cause bias (like for example starting bias (O' Brien and Viramontes (1994)). It can be for example that WTP questions overestimate the real WTP (Blumenschein et al., 2004). Another argument about causing bias may be the case that measuring WTP can differ in whether they provide an incentive to consumers to reveal their true WTP and in whether they stimulate actual point-of-purchase context (Wertenbroch and Skiera, 2001). This phenomena can be tackled by asking the respondents a follow-up question, in which respondents can be asked how certain they are in buying goods. This method, described as the contingent valuation method, is a significant measure to analyze the real WTP. Evidence was found that the level of certainty for a respondent significantly increases by adding a simple follow-up question about the certainty of responses in order to measure the real WTP for products (Blumenschein et al., 2004).

Although the contingent valuation method increases the certainty of the respondents WTP in buying goods, several researchers discussed the considerations of asking WTP. An important question arising about WTP is the given that consumers really want to pay more. When are consumers really satisfied? Research was done by measuring the effect of customer satisfaction on WTP. An interesting thought in the relation between customer satisfaction and WTP is that when consumers experience a high outcome of an exchange, the WTP will be higher. Similarly, when satisfaction is low, customers can perceive a low payment as an adequate and fair exchange of a good (Homburg et al., 2005).

Guagnano (2001) also discussed considerations of WTP. He mentioned on the other hand that consumers behavior on self-interest is based on or motivated via altruism. He experienced WTP by using the ability of the Swartz model of altruism to explain WTP for recycled products. The Swartz model suggests that altruistic behavior occurs when individuals are aware of negative consequences of social conditions for others and ascribe responsibility for undertaking preventative or improved action to themselves (Guagnano, 2001). Many individuals take account of altruistic moral considerations, even when "green consumerism" demonstrates that many individuals' WTP a premium for goods that have minimal environmental impact.

The final consideration of WTP technique is the valid question is the difference for consumers between WTP and willingness to accept (WTA). The difference has been described as measures of the maximum amounts people will to pay to avoid a loss and the minimum compensation necessary for them to accept it (Knetsch and Sinden, 1984). Several researchers reported on proven evidence that wide variations have been discovered in survey responses to hypothetical options (Knetsch and Sinden,1984) which has been acknowledged by Hanemann (1991) and Coursey et al. (1987).

Next to the theoretical relevance, also the practical context of WTP can be analyzed. Several authors implies the importance of the WTP for determining their research. For example estimating consumers' WTP as a measure for improvements in the quality of multi-attribute goods is important for the producers of this good. If the WTP is known, one can estimate the overall WTP or the imputed market price for a product (Lee et al., 2004). WTP is an perfect measure of the contingent valuation method which is used in many studies. For example

Kahneman et al. (1993) uses WTP as an measure for public goods, and even ethical studies about fair trade prices on coffee has been using WTP as an measure (Pelsmacker et al., 2005).

However, there are no studies that have examined variability in consumers WTP for different type of products (Essoussi and Linton, 2010). Theoretical relationships has been derived between WTP and the produce of a product, but not within its diversity. That makes the analysis of Essoussi and Linton (2010) in a certain way unique.

II. Relationship between WTP and eco-certification

This section describes the relationship between WTP and eco-certification. First the used keywords are presented. Then, the databases are presented and the range of years, and finally the abstracts are presented from the literature study.

The following keywords are used for the analysis:
refurbished products, refurbishment, consumer buying decisions, consumer behavior, sustainability, economic rationality, remanufacture product, recycled product, recycling, reused parts, environment, environmental issues, environmental effects, environmental friendly products, recycle end-of-life products, white paper recycling, refurbish single use camera, refurbish cell phone, printer reused parts, refurbish toner cartridge, recycled tire, functional risk.

The starting keywords for analysis were WTP and eco certification. Al the other keywords were combined with WTP and eco certification, this in order to put the focus on the relationship between eco-certification and WTP.

In order to find relevant and interesting articles, the following databases were used: Combisearch, Web of Science, Jstor, Scopus and Google Scholar. It is decided to take a wide range from years (between 1990 and now) in order to see the development in the literature of eco-certification on WTP. Around 70 articles were initially found for the analysis, and the articles that were selected for this research were the articles who has the closes relationship with WTP and eco-certification. The main aim of this literature study was to conduct a market research and find market figures in describing the relationship between WTP and eco-certification based on previous research. Initial questions were asked about the literature in order to select relevant literature for this research, like what was actually measured?; how does factors or attributes influences the relationship between WTP and eco-certifications?; are there other variables of significant influence on this relationship?; in what way can previous research contributes to this research?; why are the research findings of interest for this research?

A lot of information was found, the most relevant articles with their figures and their contribution to this research are presented in this section. Since WTP is already defined in the previous chapter, first it is of interest to define eco-certification.
Melo and Wolf (2005) describes eco-certification as ”products certified as eco-friendly (e.g., bananas, coffee, fish, lumber, tourism packages) are differentiated from generic commodities by virtue of producers’ adherence to a set of technical standards (best management practices) aimed at mitigating environmental degradation”.
Melo and Wolf (2005) have sought to determine whether eco-labeled products are produced in a manner that conserves natural resources and mitigates risks to ecological integrity. The authors report on a 2003 audit of farming practices in banana production in Ecuador. They find that certificated farms significantly outperform non-certificated farms on all environmental assessment criteria.

Fuerst and McAllister (2011) investigated the price effects of environmental certification on commercial real estate assets. They found that there are likely to be three main drivers of price differences between certificated and non-certificated buildings. These are additional occupier benefits, lower holding costs for investors and a lower risk premium. Results of their analysis was that eco-certificated buildings have both a rental and sale price premium.

Will consumers pay more for certified wood products? This was the title and main research question of the research from Forsyth et al. (1999). The authors wanted to present insight into customers' attitudes towards certified wood products, which can help gauge whether a viable market exists (Forsyth et al., 1999). 300 interviews outside home improvement retail outlets in three cities in the province of British Columbia in Canada were conducted. Locations were chosen in an large urban area (Vancouver) and more rural areas (Kelowna and Prince George) (Forsyth et al., 1999).
Forsyth et al., (1999) created four scenarios in measuring certification on WTP, First, the certificated product was priced at the same level as the non-certificated product; Second, the certificated product was priced 5 percent higher than the non-certificated product; Third, the certificated product was priced 10 percent higher than the non-certificated product; Fourth, the certificated product was priced more than 10 percent higher than the non-certificated product. In the first scenario, 94.3 % of the respondents would pay more for the certificated product. The second scenario, 67.3% of the respondents would pay more for the certificated product. The third scenario, 28,3 % of the respondents would pay more for the certificated product. 13 % of the respondents would pay more for the certificated product in the fourth scenario. Based on the analysis of Forsyth et al., (1999), it was found that there is evidence of some relationship between customers' place of residence and the likelihood of buying certificated wood products. The data for age, income and market segment, which also was analyzed, did not indicate any relationship with the likelihood of buying certified wood products.

Another example of wood certification is the research from Archer et al. (2005), who conducted an exploratory research about the comparison of the impact of forest certification labeling and advertising on the purchase intent of wood and paper products by end-use consumers. The main results of their survey were that Canadians are concerned about the environment, have positive attitudes towards certification, and are willing to alter their purchase habits to favor certificated wood and paper products. They also indicated a lack of awareness regarding forest certification, and that advertising was the preferred strategy to increase general awareness among consumers.

According to Chen (2001), the main concern towards the success of green product development depend on the private and public sectors, whereas the industry green product development rather as an annoying burden or an inevitable threat sees than an economic opportunity. Chen (2001) also argues that successful implementation of green products depends on governmental regulations, and the implementation of these regulations for the industry for adopting green products.

Eco-certification can also have a less successful outcome. Linsheng et al. (2007) investigated Chinese perspectives on tourism eco-certification, and try to see if eco-certification as an management tool can be linked with the growing nature and adventure tourism industry of China. However, this investigation was rather unsuccessful. In five years, only two hotels, two parks and one museum in China were certificated. To see whether there was some progress, the authors focused on research on Chinese government publications, language research literature, and stakeholder interviews.

Eco-certification and its relation to WTP has been tested in the research of Miller and Unnevehr (2001). The motivation for their research was that most consumers surveyed have concerns about pork safety. This especially among households with children, lower incomes, older consumers and blacks. Lower consumption of pork was associated with higher concern (Miller and Unnevehr, 2001). A telephone survey was conducted in Illinois among 609 households. An important result was that respondents had more confidence in USDA certification (US Department of Agricultural Marketing Service) than in industry certification (62,3 % of the total response). Consumers were asked how much additional money per pound they would pay for a certified pork product. The consumers were given four options, paying $ 1,00 extra per pound (25,6 % of the respondents filled this in); paying $ 0,50 extra per pound (22,7 % of the respondents filled this in), or paying $ 0,25 or $ 0,10 extra per pound (25,9 % of the respondents filled this in). However, 18,6 % of those surveyed were not WTP anything for a safer pork product (Miller and Unnevehr, 2001). The authors don't mention anything if consumers filled in that they' WTP less for certificated pork products. Also by categorizing, they do not mention if a respondent for example wants to pay more than an additional $ 1,00 for certificated pork product.

Next to pork safety, Umberger et al. (2009) analysis the differences in WTP between two regional beef products, ground beef and USDA choice rib eye steak. Consumer collected data from a US national online survey was used to estimate the factors helping explain WTP (Umberger et al., 2009). It was found that consumer preferences for natural and regionally produced beef are explained by perceptions of benefits and altruistic behavior (Umberger et al., 2009). The authors found that the probability of a consumer WTP depends on purchase behavior and shopping location, stated importance of production attributes, awareness and interest in private and civic agricultural issues (Umberger et al., 2009). This study proves that WTP can depend on lots of factors, which makes it more or less difficult to stay focused since lots of factors can influence WTP.

WTP has for example been tested on organic fruit and pesticide ban (Canavari et al, 2005). The study of Canavari et al. (2005) describes the results of a survey for exploration WTP in two forms, a contribution for the abolition of the use of pesticides on fruits, and an premium price for apples guaranteed by a certificated label. The data were conducted from a questionnaire in which the sample was split into two groups, first a face-to-face survey of customers of large retail outlets around Bologna, and the second was an internet sample. The study also discusses the elicitation methods in contingent valuation (as discussed in chapter one of the theory about WTP in general). Open-ended responses are found to be producing much smaller mean WTP estimates than the discrete choice ones (Canavari et al, 2005). They found evidence for this argument in their study, for discrete choice questions mean WTP estimate was around four times higher than of the mean WTP estimate scores for the same open-ended question. However, a big disadvantage of their research was that for the Internet sample, the respons rate was only 6 %, and self-selection (a threat to validity) in this sample can also explain that the mean WTP is higher compared to the face-to-face survey.

Price premium to measure WTP has been successfully tested on another research about eco-labeled apples in order to prevent pesticides on their apples (Loureirro et al, 2002). It was concluded that female respondents with children, and strong environmental and food safety concerns are more likely to pay a premium for eco-labeled apples. So this study suggest that it is worthwhile to see whether eco-certification plays an role WTP for products.

A similar study conducted from the same author was about fair trade and eco-labeling on coffee, does this wake up consumer conscience (Lourreiro and Lotade, 2005)? Based on a face-to-face survey, consumer preferences were revealed for ethical and environmentally sound labeling programs in coffee. The authors asked valuation questions regarding the fair trade, shade grown and organic coffee labels by using a payment card format, after consumers were previously informed about each of the labeling programs. Results suggests that consumers are very receptive toward both fair trade and shade grown coffee labels, and consequently WTP a higher premium for these labeling programs than for the organic coffee.

Eco-labeling can be an effective way in a market-based solution to the under consumption of eco-friendly products in developing and developed countries. This was studied in the research from Basu et al. (2003). An important result of their research was that labeling depends on how monitoring intensities respond endogenously to economic growth, openness to trade and technology transfers (Basu et al., 2003). Eco-labeling can be defined as “a practice of providing information to consumers about a product which is characterized by improved environmental performance and efficiency compared with similar products” (Basu et al., 2003). The authors state that if consumers view labeled products as private goods then labeling does help in altering the incentives of producers in developing countries to shift to eco-friendly methods of production (Basu et al., 2003). They argue that income gains achieved via international trade can only be beneficial to the environment. However, producers should be careful with false labeling. If this occurs too much, eco-friendly products can be balanced towards normal products.

Another perspective on eco-labeling is based on the research from Sedjo and Swallow (2002). They used wood products as an example to see whether eco-labeling necessarily generates different prices for labeled and unlabeled products. The main idea using eco-labeling is that international environmental organizations propose voluntary eco-labeling as an market incentive to promote industry or to operate in an ecologically sustainable and environmentally friendly manner (so it is not obligatory). However, the authors of the article find it questionable whether voluntary eco-labeling will cause producer profits in a competitive industry to decline and whether eco-labeling will necessarily generate different prices for labeled and unlabeled products.

Sedjo and Swallow (2002) found contradictions between surveys that have found consumers to be WTP a premium for certificated wood products and the market evidence that certificated wood does not trade at the premium. They argue on the supply side that for example, increasing production cost for eco-labeling is not considered in many surveys, and that it would likely vary across products. A existence of a price premium could be important for defraying these costs and could create additional incentives to produce more environmentally friendly eco-labeled goods. On the empirical side there is some evidence about the markets viability of certified products. The authors mentioned that a new line of eco-labeled sanitary paper products stressed the high recycled content that competed with its existing non eco-labeled line. Sales declined significantly for the eco-labeled sanitary paper.

An important finding of the research from Sedjo and Swallow (2002) is that there are reasonable circumstances in which some portion of consumers is WTP a price premium but a premium (price differential) will not arise in the market. According to the authors, even if surveys indicate that consumers' WTP a premium, this does not yield that it is an sufficient condition to generate a premium in the market. For a voluntary system, it depends on the actual demand, the costs of certification and if the amount of new demand created by certification is low, then the market price is less likely to generate a price premium. However, when costs of certification are low, and certification with labeling creates significant new demand, the price alternative is increasingly likely to be generated by voluntary market activities.

The influence of eco-labeling on wood furniture has been researched to investigate WTP (Veisten, 2007). Four convenience samples comprising customers of two IKEA stores, one in Norway and one in England, were conducted to analyze WTP on an environmental attribute trough certification and eco-labeling. Per store, two survey-based methods were used, the conjoint analysis and the contingent valuation method. Conjoint analysis indirectly elicits attribute values, or part-words, based on either rating or ranking of product profiles with different attribute levels or choices between the profiles (Veisten, 2007). In contingent valuation, value elicitation has been whole-product focused, set out either as an open-ended question of maximum WTP for a given improvement in a public good provision level, or as a closed-ended question formed as an dichotomous choice between 'getting the public good for a given payment' or 'no public good improvement for no payment'(Veisten, 2007).

In the English IKEA, the sample size for the conjoint analysis was 133 people, whereas 151 people participated in the contingent valuation method. For the Norway store of IKEA, 125 people were assed to the conjoint analysis, and 181 to the contingent valuation method. Results indicated that in the sample of English IKEA, customers responding to conjoint analysis, extra median WTP was 16% of the price of the existing unlabelled product. For the contingent valuation method, the same was measured and it was found that the price premium was about 7,5%. For the Norway IKEA customers, the conjoint analysis resulted that customers WTP a price premium was 2%, and for the contingent valuation this was 6% (Veisten, 2007). The difference between the two methods is describes as the conjoint analysis respondents gave an indirect WTP trough choice that included alterations in price and wood species, in addition to labeling, whereas the contingent valuation respondents stated their WTP directly (Veisten, 2007). This research is interesting in the sense that two different survey methods resulted in different results for different samples. In the English IKEA, asking the respondents directly their WTP (contingent valuation method), WTP seems to decrease compared to asking WTP indirectly (conjoint analysis method). In the Norway IKEA, it is the other way around, whereas asking directly WTP seems to be higher than asking indirectly WTP. The most important and interesting point of these results is that for eco-certification and labeling, consumers WTP increases.

The conjoint analysis method has also been researched by measuring eco-labeling on washing machines and light bulbs (Sammer and Wüstenhagen, 2006). Their research provides empirical data on the influence of eco-labels on consumer behavior for household appliances. 300 choice-based conjoint interviews were conducted, which measures the relative importance of various product attributes for consumers. The relative importance was investigated for the EU energy label compared to other product features (like brand name) in consumers' purchasing decisions. Brand names for examples were measured by selecting a few brands with their product attributes, and were the respondents must choose their favorite brand based on these attributes. The most important result is the significant WTP for A-labeled energy efficient products, which result in a price premium of 30% for the washing machines compared to the average price, and a price premium for 60% for light bulbs. The high price premium for the light bulbs can be explained that people have become used to relatively expensive energy saving lamps, and that they are aware of their additional feature of longer lifetime (Sammer and Wüstenhagen, 2006).

Although many previous examples gives a lot of benefits for eco-labeling and certification, and also represents a higher WTP compared to the standard prices, also some criticism has been arisen on eco-labeling. According to Harrison (1999), eco-labeling attempt to harness the market by helping environmentally friendly motivated consumers identify products that are less harmful to the environment. Three government sponsored programs, in Canada, the European Union and the Nordic countries with eco-labeling of sanitary paper products provides cause of skepticism (Harrison, 1999). Via a case study, three underlying assumptions about the eco-labeling model are challenged. Harrison (1999) mentioned that the responsiveness of eco-labeling agencies and their political partners which are sensitive for pressures to relax certification criteria from firms threatened with a loss of market share can undermine the ability of eco-labels to identify genuine industry leaders. Another argument from Harrison (1999) was that evidence of industry boycotts of eco-labels in all three jurisdictions studied suggests that a few industrial sectors can resist competition on

environmental grounds. According to Harrison (1999), eco-labels can better be seen as complement to, rather than substitute for regulatory instruments.

Hamilton and Zilberman (2006) are discussing the possibility of fraud of eco-certification and the price premium consumers are WTP for these eco-certificated products. According to the authors, consumers are voluntarily paying significant price premiums to acquire unobservable environmental attributes in green markets. The paper attempt to consider the performance of eco-certification under circumstances were consumers cannot distinguish between environmental attributes in good and regular goods, but can form rational expectations about illegal activities in green markets (Hamilton and Zilberman, 2006).

The study of Hamilton and Zilberman (2006) resulted in four different main results. First, when entry barriers limit the number of firms, fraud is less prevalent. Second, conventional policies about the environment on polluting techniques even increases incidence rates of fraud. According to the authors, this can result in the given that the use of non-polluting techniques which could emerge in green markets will be excluded. Third, an important finding of their study was that voluntary certification policies can increase outputs and raises profits for the firms, and can exclude fraud. Fourth and final, the effect of the situations were optimal resource allocation is applicable, this will result in negative certification fees per unit, and it results in positive certification fees for the responsible certifying agent (Hamilton and Zilberman, 2006). These four results can be important for markets to justify and modify to green markets where certification plays an determining role.

Roe et al. (2000) analyzed US consumers' WTP demand for green electricity. The authors designed a survey to elicit consumers' WTP for environmental attributes of deregulated residential electricity services. The authors used an hedonic analysis (which measures demand or a value based on the quality and presence of natural attributes) and found that several product features not considered in the survey help explain the real price premiums, including for example green eco-certification. So basically this research also motivates that eco-certification is an factor for WTP on products.

Another complete other example is the empirical investigation of the roles of attitudes in hotel customers' eco-friendly decision making process (Han et al., 2009). The relationships were tested among attitude toward green behaviors, overall image, visit intention, word-of-mouth intention and WTP more by considering the effects of gender and age in a hotel context (Han et al., 2009). The overall image has an positive effect on the attitude towards green behaviors and WTP more for hotel customers. A green hotel can be defined as "an environmentally friendly hotel establishment that practices green principles and programs to help save the environment as to improve the hotel's effectiveness (Han et al., 2009). So if hotels can shift their focus towards a more environmental friendly or green hotel, its overall image and attitude toward green behaviors resulted in a higher WTP for customers.

Moon and Balasubramanian (2003) studied WTP for non-biotech foods in the US and the UK. The authors used a closed-ended and payment card formats to elicit WTP for breakfast cereals made from non-biotech ingredients. US consumers are WTP 10% - 12% premium to avoid biotech breakfast cereals, whereas UK consumers are WTP a 19% - 35% premium (Moon and Balasubramanian, 2003). An important factor shaping WTP are risk perceptions about agro biotechnology for non-biotech breakfast cereals. Consumers are more likely to pay a premium if the perceived risks to human health from the use of biotechnology in crop/food production, or affiliated biotech foods unfavorably with morality or multinational corporations. On the other hand, consumers are less WTP when consumers are associated with agro biotechnology with various benefits like for example reduction in chemical use in crop production, mitigation of world food shortages and improved nutritional content (Moon and Balasubramanian, 2003). The authors used a questionnaire based on the contingent valuation method which was distributed among 5200 US households from the National Panel Diary group (based on stratified sampling like for example geographic regions and market size), and had a response of 3060 consumers which is nearly 58%. The same was done for the UK, but here an online survey was conducted among 9000 people, nearly 2570 consumers (28,5 response rate) filled in the questionnaire. Concluding remarks about the study was that the extent of WTP for non-biotechnical breakfast cereals differs across the US and the UK. Differences in risk perceptions and strength of the demand for non-biotech foods may contribute to the divergence in regulatory approach towards biotech foods in the US and the UK (Moon and Balasubramanian, 2003). This study contributes in a way that it is proven that a lot of factors like in this case for example risk perception is important for shaping WTP.

Misra et al. (1991) studied the consumers' WTP preference for fresh produce that has been certified as free from pesticides. An important finding of this research is that consumers prefer testing and certificating (about 90% of the respondents considered testing and certification somewhat or very important), however they oppose large price mark-ups for fresh produce with certified free pesticides residues. They indicate that there is a high level of perceived risk among American consumers about pesticides residues. An important limitation of their research was that the authors did not collect any information on why some consumers are unwilling to pay a higher price for fresh produce.

The level of risk is also discussed in the research from Essoussi and Linton (2010). The level of functional risk can be based on different product attributes, like for example level of performance, level of associated risk of physical harm to the consumer (Essoussi and Linton, 2010). The main argumentation for analyzing this issue is that the level of functional risk can influence a consumers buying decision. A nice example would be that a re-treaded tire may be perceived as having a high level of risk compared with recycled paper, and consumers may evaluate the product associated with its perceived risk (Essoussi and Linton, 2010). Each product category has its own level of risk, and if recycled components are influencing consumers' evaluation of recycled products, consumers are being expected to be less willing to pay price premium prices associated with high functional risk. (Essoussi and Linton, 2010).

The role of perceived risk was also tested in a retail setting in which the antecedents and consequences of perceived value for the consumers was tested (Sweeney et al., 1999). The authors tested a model by using a sample of consumers who are looking for an electrical appliance. The model contains of several attributes like encounter specific functional service quality, encounter specific technical service quality, perceived product quality and perceived relative price. These attributes are representative for the perceived performance / financial risk, which overall measures the perceived value for money, related to its price, and which eventually indicates the willingness-to-buy for a customer (Sweeney et al., 1999). An important result of the research was that it was confirmed that not only perceived product and perceived service quality lead to the perceived value for money in a service encounter, but that these attributes also reduces perceived risk (Sweeney et al., 1999). Another result was that perceived value for money played as an mediator factor between perceived quality, price and risk and willingness-to-buy (Sweeney et al., 1999). According to the results of the research, the authors mention that perceived risk has an more powerful effect on perceived value than perceived relative price or perceived product quality. Perceptions of perceived risk can be reduced via the technical service quality from a salespersons' knowledge (Sweeney et al., 1999). A final concluding finding from this research is that perceived value of money can be considered as a strong mediator of the perceived risk on willingness to buy (Sweeney et al., 1999). The data of the survey was collected from two different samples of active shoppers in two cities in Australia. 1016 questionnaires were set out in the first city (with a response rate of 60%), and 732 questionnaires were set out in the second city (with a response rate of 63%).

Perceived risk was also tested in an Internet shopping setting (Forsythe and Shi, 2003). The study examined the nature of perceived risks associated with Internet shopping and the relationship between types of risk perceived by Internet shoppers and their behaviors (Forsythe and Shi, 2003). The authors used different types or attributes of perceived risk which are of concern for Internet shoppers and browsers: Financial, product performance psychological and time convenience loss/risk. Findings of their research suggests that perceived risk is a useful context to explain barriers in online shopping (Forsythe and Shi, 2003). In the exploratory study, the authors modeled the types of perceived risk next to the demographics of the Internet shoppers and browsers, and tested what the influence was on online shopping behavior. The online shopping behavior was associated with three attributes, namely amount spent on web last six months, frequency of searching with intent to buy and frequency of purchasing online (Forsythe and Shi, 2003). Questionnaires were conducted via the Graphic, Visualization and Usability Center from Georgia Institute of Technology. Two questionnaires were conducted, one about the demographics and one about finding product information and purchasing (Forsythe and Shi, 2003). It was found that the perceived risk has an high influence on the Internet browsers, and for the Internet shoppers the perceived risk may not significant differ (Forsythe and Shi, 2003).

In general, it can be concluded that based on previous research, eco-certification and WTP presents a positive relationship. The most studies confirms that eco-certification has significant influence on WTP for products in the fact that consumers are WTP a premium for certificated products. Examples can be given like the study from Melo and Wolf (2005), which found that certificated firms outperform non-certificated forms in case of banana production. Lourreirro et al., (2002) found a significant relationship between consumers' WTP a premium for eco-labeled apples, and a few years later Lourreiro et al. (2005) found that consumers WTP a premium towards coffee labels. Other examples of research from different branches and products where certification positively influences WTP are the study from Roe et al. (2000) about green electricity; the study from Han et al., (2009) were consumers' WTP a premium for greener hotels; the research of Forsyth et a., (1999) and Archer et al. (2005) were consumers WTP a premium for certificated wood; The eco-labeled wood furniture for two IKEA's in Norway and England (Veisten, 2007); Miller and Unnevehr (2009) who found that consumers WTP more for safer certified pork, and Umberger et al. (2009) who analyses the difference between two regional beef products and finally the research from Sammer and Wüstenhagen (2006) who measured the influence of eco-labeling on washing machines and light bulbs.

However, some studies reported also negative effects or skepticism of eco-certification. Harrison (1999) reports that eco-labeling can be seen as an form to harness the market, because eco-labeling on products can also be done on products which are less harmful for the environment. Hamilton and Zilberman (2006) even mentioned that eco-certification can cause fraud. This is the case when consumers pay a significant premium for a product for unobservable environmental attributes in green markets. According to the authors, when consumers are not able to distinguish between environmental attributes in goods and regular goods, illegal activities can be conducted in the market.

A less successful implementation of eco-certification in markets was reported in the research of Sedjo and Swallow (2002). They found that for eco-labeled sanitary paper, although consumers' WTP a price premium, a price differential is not arisen in the market, since the costs of implementing eco-labeling outperform the revenues, which resulted that sales significantly decreased of sanitary paper. However, the authors reports that if costs of implementing eco-certification can be held at an low level, and eco-certificating can create significant new demand, the chance of adopting successfully eco-certification on products will be a lot higher.

A final consideration of the literature study is that the level of functional risk can influence the WTP for products. Sweeney et al. (1999) reports in their research that the level of perceived performance and financial risk influences the perceived value of money for a product, which is a mediating factor for determining WTP. In a total different setting, perceived risk is also of influence for Internet shoppers, which looked at the financial, product performance, psychological and time convenience loss/risk of products. Risk perceptions were also of influence in the research from Moon and Balasubramanian (2003). The authors found that consumers' WTP a significant premium for breakfast cereals when the perceived risk towards human health can be decreased. Misra et al. (1991) also reports that consumers are WTP a premium for fresh produce which is certified as free from pesticides. So in general, the level of risk is of influence for consumers' WTP on products.

III. Research hypothesis

Based on the theoretical perspective, research hypothesis are drawn in order to compare the WTP for certificated product groups with non-certificated product groups. Also the level of functional risk discussed in the theory will be researched via a hypothesis. A very important note here is that the relative mean differences of WTP for products will be compared, so not the differences compared to the original standard price. WTP in this situation will be noted as WTPrel.

In the first part the differences in WTPrel. for certificated vs. non-certificated products will be compared. Per product group will be analyzed whether respondent's WTPrel. is higher for certificated products compared to the non-certificated products.

First, differences in WTPrel. between branded certificated products vs. branded non-certificated products will be compared. In this way, it can be measured whether respondent's WTPrel. for branded and recycled products with an eco-certificate is higher than for branded products without an eco-certificate.

H1: The WTP is higher for branded and recycled products with an eco-certificate than for branded products without recycled components and eco-certificates.

The first hypothesis not only compares the differences in WTPrel. for branded certificated vs. branded non-certificated products, but also the differences in WTPrel. between recycled vs. non-recycled content. So in order to make a more complete comparison, the next step would be to compare the differences in WTPrel. for branded certificated products with recycled content vs. branded non-certificated products with recycled content. This will be analyzed in hypothesis two.

H2: The WTP is higher for branded and recycled products with an eco-certificate than for branded and recycled products without an eco-certificate.

The second part is the investigation whether the WTPrel. differs along the product categories. This will be done by comparing the WTPrel. of the different branded certificated product categories. The main aim of this analysis is to see whether there is a significant relationship between the different type of products.

H3: Consumers WTP premium price with an eco-certificate is product specific.

The third and final part of the investigation is whether the level of functional risk influences WTPrel. for consumers. This will be done by comparing the WTPrel. of the different certificated branded product categories. The main aim of this analysis is to see how consumers respond to certificated products with high level risk (for example a retreaded tire) vs. low level risk (for example white paper). The analysis will be done by comparing WTPrel. branded certificated product groups with each other.

H4: The level of functional risk associated to the product category influences consumers' WTP a premium price between branded and recycled products with an eco-certificate and branded products containing recycled components.

III. Research Strategy

I. Sampling

For this analysis, 230 first year bachelor students from the University of Twente were asked to fill out an questionnaire. The first year bachelor students were selected from four different programs: Business Administration (n=87); International Business Administration (n=21); Civil Engineering (n=41) and Industrial Design (n=81). All questionnaires were collected in the period January and February 2011.

The survey was held in five different classrooms. All students were asked to voluntarily participate by filling in an questionnaire about environmentally friendly products. All the present students from a particular college class participated in the survey. The response rate from the selected sample was close to 100 %. Only one college class from the program Industrial Design was asked to redo the questionnaire, because the first time only about 20 students were present at the class. The second time, the other 61 students filled in the questionnaire. Only one questionnaire was dropped out for analysis since only a few answers were filled in.

Probability sampling was used in order to determine if the observed sample can be a representation of the whole population (Babbie, 2004). In order to reduce the sampling error, the main strategy was to use stratified sampling. First, only first-years bachelor students from the different programs were selected in order to narrow down the population. Second, one college class (and in the case of Business Administration two) from the total of first-years bachelor classes was randomly assigned in order to fill out the questionnaire. We expect that the respondents from the college class have representative characteristics compared to the whole population of first-year bachelor students. By stratifying the population via this way, bias was minimized.

Because stratified sampling was used, generalizations of the populations are possible. It can be for example possible to measure the relation between male and female, and see if this is representative to the whole population. This can also be done with nationality or ethnic origin, or strictly taken even maybe with annual household income from the respondents parents. In general, since stratified sampling was used, we expect the results from the respondents in a college class would be representative for the whole population of first-year bachelor students from a specific bachelor program, so generalizations about WTP and certification can be made towards the population.

In order to treat missing data or cases, a Missing Value Analysis (MVA) will be executed in order to check whether missing cases have influence on the outcome of a test statistic. It can happen that a respondent for some reason is unable or refuses to answer a question (Huizing, 2007). Appendix B contained with detailed information about MVA.

For WTP with certificated products, it seemed that the data missing was not completely random. Looking at the univariate statistics, twelve cases were missing for each of the

certificated product groups (total of six products), which means that 5,2 % of the total cases were missing. When running the Little's MCAR (Missing Completely at Random) test, it was found that data was not missing completely random (ρ<0,000).

II. Operationalization

WTP was measured by asking the respondents the maximum price they would pay in percentages above or under the standard price for a product. In this way the relative mean differences between product groups can be compared to each other, since the mean score which deviates from the standard price for each product group is known. This is reliable since it has already been successfully tested and executed in previous research (Essoussi and Linton, 2010). It is valid because it is precisely asked how much respondents want to pay more or less for a branded certificated product when it has an certain value in Euro's.

Eco-certification was measured by asking the respondents the maximum price they would pay in percentages above or under the standard price when an recycled and branded product has eco-certificate, and how important eco-certification is for respondents. It is reliable because also the explanation of eco-certification is presented in the survey. It is valid because it is precisely asked how much respondents want to pay more or less for a branded certificated product when it has an certain value in Euro's.

The level of functional risk is measured by looking at the harm product groups can cause to a customer or the risk consumers encountered when undertaking purchase decisions. In this way the products with an high level of risk can be compared with the products of a low level of risk comparing their WTPrel. This is reliable since it has already been successfully tested and executed in previous research (Essoussi and Linton, 2010). It is valid because it actually measures the relationship between the certificated products.

III. Methods of analysis

This section contains the methods used for analyzing the constructs spelled out in the operationalization.

The method used for analysis will be presented via hypothesis testing. The advantage of hypothesis testing is that it can describe the direction of a relationship (De Veaux et al. 2008). Based on an alpha level of 0.05, it can be stated that either the hypothesis is rejected, or it can be said that there is a significant relationship between the two tested variables. If the measured value is below the alpha level, it can be stated that there is a certain (positive or negative) relationship.

The used test will be paired samples t-test, because the WTPrel. question is asked multiple times in the questionnaire, so the scaled items are related to each other. De Veaux et al. (2008) suggested that in that case a paired samples t-test is appropriate, because also the standard deviation of the total population is not known (so a z-test would be inappropriate). If the assumptions for the t-test are not fulfilled, the signed rank test of Wilcoxon would be an perfect alternative (De Veaux et al. 2008).

Two additional questions were asked in the questionnaire compared to the original questionnaire from the Canadian study. In the first additional question, for each of the six different products (including the brand), the value of the attractiveness of purchasing environmentally friendly products over their standard counterparts was asked, in relation with an independent certificate. This means that an individual agency tests and certifies that sustainable practices have been followed in the production of the good.

The second and final additional question describes the importance that recycled products should have an eco-certificate for the respondent (seven point Likert scale was used). This question is added and based on the contingent valuation method (Blumenschein et al., 2004). With this two additional questions, we would like to see if there are patterns between the importance of eco-certification for respondents, WTPrel. including these certificates, and compare this with the general WTPrel. for environmentally friendly products.

The analysis will be done in four steps. First, WTPrel. between branded certificated products vs. regular branded non-certificated products will be compared. In this way, it can be measured whether respondent's WTPrel. for branded and recycled products with an eco-certificate is higher than for regular branded products without an eco-certificate.

H1: The WTP is higher for branded and recycled products with an eco-certificate than for branded products without recycled components and eco-certificates.

This will be done by comparing the differences in WTP between branded products without recycled components and without a eco-certificate vs. branded and recycled products with an eco-certificate for each product group. Since the data are paired, a paired samples t-test can be a method to execute the analysis if the assumptions are fulfilled. If the assumptions

cannot be fulfilled, the Wilcoxon signed rank test would be a good alternative (De Veaux et al. 2008).

Second, the WTPrel. for branded certificated products with recycled content vs. branded non-certificated products with recycled content are compared. This in order to make a more complete comparison, so the recycled component is added for the branded product.

H2: The WTP is higher for branded and recycled products with an eco-certificate than for branded and recycled products without an eco-certificate.

This will be done by comparing the differences in WTP between branded and recycled products without a eco-certificate vs. branded and recycled products with an eco-certificate for each product group. Since the data are paired, a paired samples t-test can be a method to execute the analysis if the assumptions are fulfilled. If the assumptions cannot be fulfilled, the Wilcoxon signed rank test would be a good alternative (De Veaux et al. 2008).

Third, the investigation whether the WTPrel. differs along the product categories will be analyzed. This will be done by comparing the WTP of the different branded certificated product categories. The main aim of this analysis is to see if consumer evaluations of branded and recycled products with an eco-certificate are influenced by the type of product. If consumers perceive a positive attitude towards certification, WTP premium price will not be influenced by the product category, so it will be product specific.

H3: Consumers WTP premium price with an eco-certificate is product specific.

This will be done by comparing the differences in WTPrel. between the certificated product groups. Since the data are paired, a paired samples t-test can be a method to execute the analysis if the assumptions are fulfilled. If the assumptions cannot be fulfilled, the Wilcoxon signed rank test would be a good alternative (De Veaux et al. 2008).

The final step is to analyze whether the level of functional risk influences WTPrel. for consumers. This will be done by comparing the WTPrel. of the different certificated branded product categories. The main aim of this analysis is to see how consumers respond to certificated products with high level risk (for example a retreaded tire) vs. low level risk (for example white paper). The analysis will be done by comparing WTPrel. branded certificated product groups with each other.

H4: The level of functional risk associated to the product category influences consumers' WTP a premium price between branded and recycled products with an eco-certificate and branded products containing recycled components.

This will be done by comparing the differences in WTPrel. between the certificated product groups. Since the data are paired, a paired samples t-test can be a method to execute the analysis if the assumptions are fulfilled. If the assumptions cannot be fulfilled, the Wilcoxon signed rank test would be a good alternative (De Veaux et al. 2008).

IV. Results

This chapter presents a detailed analysis of the results. First, the absolute mean values are presented for all the six product groups, in which the branded, recycled and eco-certificated mean values of the product groups are compared. Second, per hypothesis, the results are presented based on the data analysis, in which the relative mean values of WTP are compared (WTPrel.). A sample split was conducted to analyze the differences between the group Business Administration (bachelor International Business Administration and bachelor Business Administration) and the group Engineering (bachelor Industrial Design and bachelor Civil Engineering). Per hypothesis, the sample split between the two groups are presented.

I. Descriptive statistics: Comparing absolute mean values

Before comparing the relative WTP for the six product groups which is done in the four hypotheses, first the absolute mean values for the six product groups are presented. The first table contains the mean scores in percentages based on the standard price of a product for all the six product groups.

(Table 1: Absolute mean values compared to their standard price for the six product groups)

	White paper	Single use camera	Cell phone	Printer	Toner cartridge	Car tire
Standard price	€ 10,-	€ 10,-	€ 100,-	€ 100,-	€ 50,-	€ 100,-
Only the branded product	-0,34	-0,66	0,08	0,94	-0,14	1,54
With recycled component	0,68	-4,11	-6,16	-4,31	-7,00	-5,70
With eco-certification	1,67	-0,65	-2,38	-1,49	-1,98	-2,52

For White paper, the standard price is € 10,-. For Xerox white paper, it seems that respondents WTP decreases with 0,34 % on average compared to the standard price. However, for Xerox white paper with recycled content, respondents' WTP seems to increase with 0,68 % compared to the standard price. When adding an eco-certificate on Xerox white paper with recycled content, respondents' WTP seems to increase further to 1,67% above the standard price.

For a single use camera, the standard price is € 10,-. For a Kodak single use camera, it seems that respondents WTP decreases with 0,66 % on average compared to the standard price. For a refurbished Kodak single use camera, respondents' WTP seems to further decrease with 4,11 % compared to the standard price. When adding an eco-certificate on a refurbished Kodak single use camera, respondents' WTP seems to recover compared to the recycled component, but it still is 0,65 % under the standard price on average.

For a cell phone, the standard price is € 100,-. For a Nokia cell phone, it seems that respondents WTP increases with 0,08 % on average compared to the standard price. For a Nokia refurbished cell phone, respondents' WTP seems to decrease with 6,16 % compared to the standard price. When adding an eco-certificate on a Nokia refurbished cell phone, respondents' WTP seems to recover compared to the recycled component, but it still is 2,38 % under the standard price on average.

For a printer, the standard price is € 100,-. For a HP printer, it seems that respondents WTP increases with 0,94 % on average compared to the standard price. For a HP printer containing reused parts, respondents' WTP seems to decrease with 4,31 % compared to the standard price. When adding an eco-certificate on a HP printer containing reused parts, respondents' WTP seems to recover compared to the recycled component, but it still is 1,49 % under the standard price on average.

For a toner cartridge, the standard price is € 50,-. For a HP toner cartridge, it seems that respondents WTP decreases with 0,14 % on average compared to the standard price. For a refurbished HP toner cartridge, respondents' WTP seems to further decrease with 7,00 % compared to the standard price. When adding an eco-certificate on a refurbished HP toner cartridge, respondents' WTP seems to recover compared to the recycled component, but it still is 1,98 % under the standard price on average.

For a car tire, the standard price is € 100,-. For a Michelin tire, it seems that respondents WTP increases with 1,54 % on average compared to the standard price. For a Michelin tire with recycled content, respondents' WTP seems to decrease with 5,70 % compared to the standard price. When adding an eco-certificate on a Michelin tire with recycled content, respondents' WTP seems to recover compared to the recycled component, but it still is 2,52 % under the standard price on average.

In general, we can conclude that for all product groups, except white paper, respondents are WTP less for the recycled component of a product. However, adding an eco-certificate on recycled products, helps to recover the WTP for the price of a standard product. For Xerox white paper, it is interesting to see that respondents' WTP is higher for the recycled content vs. the regular branded content, and that certification even further increases the WTP.

II. Hypothesis one

In this chapter, the results for the first hypothesis are discussed based on the data analysis.

H1: The WTP is higher for branded and recycled products with an eco-certificate than for branded products without recycled components and eco-certificates.

For this hypothesis, the first step was to analyze if a paired samples t-test was appropriate. This was done by checking the assumptions on paired samples t-tests (De Veaux et al., 2008).

The first step was to analyze whether the data is paired, and if the observations are independent from each other. The data are paired because they are measured on the same individuals for WTPrel. with and without an eco-certificate. Independent in case of a paired samples t-test means that the paired differences of the data are independent from each other (De Veaux et al., 2008). We assume that the paired differences are independent, since all questionnaires are individually conducted, and for example WTPrel. for a respondent is different compared to WTPrel. for another respondent.

The second step was to check if the differences are normally distributed in the population. This was tested by comparing the distributions via a normality test, in which the histogram and the normal Q-Q plot were observed for the six product pairs for the first hypothesis. This means that twelve variables independently were analyzed to see if they are normally distributed. The histograms and the Q-Q plots of the WTP for certificated products can be found in appendix D. Based on the results, all the distributions of the six WTP product groups with an eco-certificate are skewed in some way, and are not normally distributed. So it can be stated that this assumption is not fulfilled. De Veaux et al., (2008) suggested that in the case that assumptions are not fulfilled for a paired samples t-test, the Signed Rank test of Wilcoxon would be an appropriate alternative. So in order to answer the first hypothesis, a Signed Rank test of Wilcoxon will be used.

Table two presents the ranks and the test statistic of the Wilcoxon signed rank test. The descriptive statistics of the test can be found in appendix E.

(Table 2: Rank scores of the Wilcoxon signed rank test per branded product group)

		N	Mean Rank	Sum of ranks	Z	Asymp. Sig. (2-tailed)
WTP for regular Xerox white paper - WTP for Xerox white recycled paper including an eco-certificate	Negative ranks	65	47,55	3091,00	-3,528a	0,000
	Positive ranks	28	45,71	1280,00		
	Ties	124				
	Total	217				
WTP for a regular Kodak single use camera - WTP for a Kodak refurbished camera including an eco-certificate	Negative ranks	54	40,15	2168,00	-0,687a	0,492
	Positive ranks	35	52,49	1837,00		
	Ties	128				
	Total	217				
WTP for a regular Nokia cell phone - WTP for a Nokia refurbished cell phone including an eco-certificate	Negative ranks	55	45,33	2493,00	-1,820b	0,069
	Positive ranks	56	66,48	3723,00		
	Ties	106				
	Total	217				

		N	Mean Rank	Sum of ranks	Z	Asymp. Sig. (2-tailed)
WTP for a regular Hp printer - WTP for a Hp printer containing reused parts including an eco-certificate	Negative ranks	51	36,99	1886,50	-1,926b	0,054
	Positive ranks	47	63,07	2964,50		
	Ties	119				
	Total	217				
WTP for a regular Hp toner cartridge - WTP for a Hp refurbished toner cartridge including an eco-certificate	Negative ranks	48	37,22	1786,50	-1,391b	0,164
	Positive ranks	44	56,62	2491,50		
	Ties	124				
	Total	216				
WTP for a regular Michelin tire - WTP for a Michelin tire with recycled content including an eco-certificate.	Negative ranks	46	31,80	1463,00	-3,059b	0,002
	Positive ranks	49	63,20	3097,00		
	Ties	121				
	Total	216				

a. Based on positive ranks
b. Based on negative ranks

In table two, the scores of the regular branded products with the branded and recycled products with an eco-certificate are compared. The number (N) of negative ranks represents the number of respondents who's WTPrel. more for branded and recycled eco-certificated products is higher compared to the regular branded products. The positive ranks describes the reverse situation, so the number of respondents who's WTPrel. more for regular branded products compared to branded and recycled eco-certificated products. The number of ties represent the number that respondents WTPrel. does not differ between eco-certificated branded and recycled products vs. branded regular products. The mean ranks are the scores of the population, and the total ranks represents all the accumulated ranks.

Table two also represents the test statistic of the Wilcoxon signed rank test per branded product group. The z-value represent the actual test statistic, and the two-tailed significant level indicates if there is a significant difference between the regular branded product and the branded and recycled product with an eco-certificate. The z-value can either be based on positive ranks (were respondents WTPrel. is higher for regular branded products compared to the eco-certificated products) or negative ranks (were respondents WTPrel. is higher for eco-certificated products compared to the regular branded products).

Conclusions about the statistically significant value will be based on the alpha level (α=0,05). Per product group, the results for the hypothesis will be presented based on the statistics from table two.

For Xerox white paper, 65 respondents wanted to pay more for the branded and recycled product with an eco-certificate vs. non-certificated branded product. However, 28 respondents wanted to pay more for the regular branded product compared to the eco-certificated branded and recycled product. For 124 respondents, WTPrel. is the same for the branded and recycled product with an eco-certificate vs. the branded product without an eco-certificate (see table two).

WTPrel. for Xerox white recycled paper with an eco-certificate in comparison with WTPrel. for regular Xerox white paper without an eco-certificate shows a significant difference (Z=-3,528; ρ<0,001). Since the z-value is based on positive ranks, we can confirm the hypothesis in this case and say that respondents are WTPrel. more for Xerox white recycled paper with an eco-certificate compared to a regular Xerox white paper without an eco-certificate based on the mean rank differences.

For a Kodak single use camera, 54 respondents wanted to pay more for the branded and recycled product with an eco-certificate vs. non-certificated branded product. However, 35 respondents wanted to pay more for the regular branded product compared to the eco-certificated branded and recycled product. For 128 respondents, WTPrel. is the same for the branded and recycled product with an eco-certificate vs. the branded product without an eco-certificate (see table two).

WTPrel. for Kodak refurbished camera with an eco-certificate in comparison with WTPrel. for a regular Kodak single use camera shows no statistically significant difference (Z=-0,687; ρ=0,492). This means that eco-certification has no significant influence on the regular Kodak single use camera.

For a Nokia cell phone, 55 respondents wanted to pay more for the branded and recycled product with an eco-certificate vs. non-certificated branded product. However, 56 respondents wanted to pay more for the regular branded product compared to the eco-certificated branded and recycled product. For 106 respondents, WTPrel. is the same for the branded and recycled product with an eco-certificate vs. the branded product without an eco-certificate (see table two).

WTPrel. for Nokia refurbished cell phone with an eco-certificate in comparison WTPrel. for a regular Nokia cell phone also shows no statistically significant difference (Z=-1,820; ρ=0,069). This means that eco-certification has no significant influence on the regular Nokia cell phone.

For a HP printer, 51 respondents wanted to pay more for the branded and recycled product with an eco-certificate vs. non-certificated branded product. However, 47 respondents wanted to pay more for the regular branded product compared to the eco-certificated branded and recycled product. For 119 respondents, WTPrel. is the same for the branded and recycled product with an eco-certificate vs. the branded product without an eco-certificate (see table two).

WTPrel. for a HP printer containing reused parts with an eco-certificate in comparison with WTPrel. for a regular HP printer shows no statistically significant difference (Z=-1,926; ρ=0,054). This means that eco-certification has no significant influence on the regular HP printer.

For a HP toner cartridge, 48 respondents wanted to pay more for the branded and recycled product with an eco-certificate vs. non-certificated branded product. However, 44 respondents wanted to pay more for the regular branded product compared to the eco-certificated branded and recycled product. For 124 respondents, WTPrel. is the same for the branded and recycled product with an eco-certificate vs. the branded product without an eco-certificate (see table two).

WTPrel. for a HP refurbished toner cartridge with an eco-certificate in comparison with WTP for a regular HP toner cartridge shows no statistically significant difference (Z=-1,391; ρ=0,164). This means that eco-certification has no significant influence on the regular HP printer.

For a Michelin tire, 46 respondents wanted to pay more for the branded and recycled product with an eco-certificate vs. non-certificated branded products However, 49 respondents wanted to pay more for the regular branded product compared to the eco-certificated branded and recycled product. For 121 respondents, WTPrel. is the same for the branded and recycled product with an eco-certificate vs. the branded product without an eco-certificate (see table two).

WTPrel. for a Michelin tire with recycled content and with an eco-certificate in comparison with WTPrel. for a regular Michelin tire shows a statistically significant difference (Z=-3,059; ρ=0,002). However, the significant difference is based on negative ranks, which means that

in this case respondents' WTPrel. is significant higher for the regular branded product compared to the branded and recycled product with an eco-certificate.

Based on this analysis, only two out of the possible six pairs shows a statistically significant difference. Based on the Wilcoxon signed rank test, respondents are WTPrel. more only for a Xerox white paper when there is an eco-certificate compared to the regular Xerox white paper. On the contrary, respondents are WTPrel. more for a regular Michelin tire compared to the a Michelin recycled tire with an eco-certificate. All the other four pairs show no statistically significant difference. So in general, it can be concluded that this hypothesis is not supported.

The next step would be to look at the sample split for the first hypothesis. As mentioned earlier, the sample has been split in two groups, namely Business Administration vs. Engineering. The Business Administration group represents the bachelors International Business Administration and Business Administration, whereas the Engineering group represents the bachelors Industrial Design and Civil Engineering. In table three, the test statistic of the Wilcoxon signed rank test is presented based on the sample split. The rank scores can be found in appendix f.

(Table 3: Test statistic of the Wilcoxon signed rank test per branded product group based on a sample split)

	Business Administration		**Engineering**	
	Z	Asymp. Sig. (2-tailed)	Z	Asymp. Sig. (2-tailed)
WTP for regular Xerox white paper - WTP for Xerox white recycled paper including an eco-certificate	-2,536a	0,011	-2,483a	0,013
WTP for a regular Kodak single use camera - WTP for a Kodak refurbished camera including an eco-certificate	-0,297a	0,767	-0,686a	0,492
WTP for a regular Nokia cell phone - WTP for a Nokia refurbished cell phone including an eco-certificate	-1,314b	0,189	-1,317b	0,188
WTP for a regular Hp printer - WTP for a Hp printer containing reused parts including an eco-certificate	-1,840b	0,066	-0,905b	0,366
WTP for a regular Hp toner cartridge - WTP for a Hp refurbished toner cartridge including an eco-certificate	-0,466b	0,641	-1,463b	0,143
WTP for a regular Michelin tire - WTP for a Michelin tire with recycled content including an eco-certificate	-2,471b	0,013	-1,857b	0,063

a. Based on positive ranks
b. Based on negative ranks

Based on the test statistic of the Wilcoxon signed rank test of table three, the differences between the Group Business Administration and Engineering can be compared.

WTPrel. for regular Xerox white paper vs. Xerox white recycled paper with an eco-certificate shows for the group Business Administration the following outcome: Z=-2,536; ρ=0,011; and for the group Engineering Z=-2,483; ρ=0,013. No real differences between the sampled groups can be detected.

WTPrel. for a regular Kodak single use camera vs. a Kodak refurbished camera including an eco-certificate shows for the group Business Administration the following outcome: Z=-0,297; ρ=0,767; and for the group Engineering Z=-0,686; ρ=0,492. No real differences between the sampled groups can be detected.

WTPrel. for a regular Nokia cell phone vs. a Nokia refurbished cell phone including an eco-certificate shows for the group Business Administration the following outcome: Z=-1,314; ρ=0,189; and for the group Engineering Z=-1,317; ρ=0,188. No real differences between the sampled groups can be detected.

WTPrel. for a regular Hp printer vs. a Hp printer containing reused parts including an eco-certificate shows for the group Business Administration the following outcome: Z=-1,840; ρ=0,066; and for the group Engineering Z=-0,905; ρ=0,366. In this case, the group Business Administration seems to be closer to achieve a significant difference for the compared variable than for the group Engineering. However, both samples represent no significant difference between the variables of the compared product group.

WTPrel. for a regular Hp toner cartridge vs. a Hp refurbished toner cartridge including an eco-certificate shows for the group Business Administration the following outcome: Z=-0,466; ρ=0,641; and for the group Engineering Z=-1,463; ρ=0,143. In this case, the group Engineering seems to be closer to achieve a significant difference for the compared variable than for the group Business Administration. However, both samples represent no significant difference between the variables of the compared product group.

WTPrel. for a regular Michelin tire vs. a Michelin tire with recycled content including an eco-certificate shows for the group Business Administration the following outcome: Z=-2,471; ρ=0,013; and for the group Engineering Z=-1,857; ρ=0,063. In this case, the group Business Administration achieves a different result than the group Engineering. For the group Business Administration, there is a significant difference comparing a regular Michelin tire with an Michelin tire with recycled content including an eco-certificate. For the group Engineering, there is no significant difference for the same tested variables.

In general, it can be said that only for the Michelin tire a sample split makes a significant difference comparing the group Business Administration and the group Engineering.

The next hypothesis checks what the difference is when recycled branded products with an eco-certificate vs. recycled branded products without an certificate are compared. Maybe the respondents are in that case WTP more for certification.

III. Hypothesis two

H2: The WTP is higher for branded and recycled products with an eco-certificate than for branded and recycled products without an eco-certificate.

For this hypothesis, also the first step was to analyze if a paired samples t-test was appropriate (similar to the first hypothesis). This was done by checking the assumptions on paired samples t-tests (De Veaux et al., 2008). Since it is already know from the first hypothesis that the certificated product groups have no normal distribution and extreme values, a Wilcoxon signed rank test will be used since the assumptions are not fulfilled.

Table four presents the ranks and the actual test statistic of the Wilcoxon signed rank test. The descriptive statistics of the test can be found in appendix E.

(Table 4: Rank scores of the Wilcoxon signed rank test per branded product group)

		N	Mean Rank	Sum of ranks	Z	Asymp. Sig. (2-tailed)
WTP for Xerox white paper with recycled content - WTP for Xerox white recycled paper including an eco-certificate	Negative ranks	48	38,28	1837,50	-2,451a	0,014
	Positive ranks	26	36,06	937,50		
	Ties	143				
	Total	217				
WTP for a Kodak refurbished single use camera - WTP for a Kodak refurbished camera including an eco-certificate	Negative ranks	66	46,67	3080,50	-4,708a	0,000
	Positive ranks	22	37,98	835,50		
	Ties	129				
	Total	217				
WTP for a Nokia refurbished cell phone - WTP for a Nokia refurbished cell phone including an eco-certificate	Negative ranks	75	51,60	3870,00	-4,410a	0,000
	Positive ranks	26	49,27	1281,00		
	Ties	116				
	Total	227				

		N	Mean Rank	Sum of ranks	Z	Asymp. Sig. (2-tailed)
WTP for a Hp printer containing reused parts - WTP for a Hp printer containing reused parts including an eco-certificate	Negative ranks	60	43,44	2606,50	-3,694a	0,000
	Positive ranks	24	40,15	963,50		
	Ties	133				
	Total	217				
WTP for a refurbished Hp toner cartridge - WTP for a Hp refurbished toner cartridge including an eco-certificate	Negative ranks	77	49,69	3826,00	-5,794a	0,000
	Positive ranks	18	40,78	734,00		
	Ties	121				
	Total	216				
WTP for a Michelin tire with recycled content - WTP for a Michelin tire with recycled content including an eco-certificate	Negative ranks	61	50,97	3109,00	-3,566a	0,000
	Positive ranks	32	39,44	1262,00		
	Ties	122				
	Total	215				

a. Based on positive ranks
b. Based on negative ranks

In table four, the scores of the recycled branded products with the branded and recycled products with an eco-certificate are compared. The explanation of the ranks per product group are discussed in the next paragraphs.

Table four also represents the test statistic of the Wilcoxon signed rank test per branded product group. The z-value can either be based on negative ranks (were respondents WTPrel. is higher for branded and recycled products compared to the eco-certificated products) or positive ranks (were respondents WTPrel. is higher for eco-certificated products compared to the branded and recycled products).

Conclusions about the statistically significant value will be based on the alpha level (α=0,05). Per product group, the results for the hypothesis will be presented based on the statistics from table four.

For Xerox white paper with recycled content, 48 respondents wanted to pay more for the branded and recycled product with an eco-certificate vs. non-certificated branded and recycled product. However, 26 respondents wanted to pay more for the branded and recycled product compared to the eco-certificated branded and recycled product. For 143 respondents, WTPrel. is the same for branded and recycled products with an eco-certificate vs. the branded and recycled product without an eco-certificate (see table four).

WTPrel. for Xerox white recycled paper with an eco-certificate in comparison with WTPrel. for Xerox white paper with recycled content and without an eco-certificate shows a significant difference (Z=-2,451; ρ=0,014). Since the z-value is based on positive ranks, we can confirm the hypothesis in this case and say that respondents are WTPrel. more for Xerox white recycled paper with an eco-certificate compared to Xerox white paper with recycled content and without an eco-certificate based on the mean rank differences.

For a Kodak refurbished single use camera, 66 respondents wanted to pay more for the branded and recycled product with an eco-certificate vs. non-certificated branded and recycled product. However, 22 respondents wanted to pay more for the branded and recycled product compared to the eco-certificated branded and recycled product. For 129 respondents, WTPrel. is the same for the branded and recycled product with an eco-certificate vs. the branded and recycled product without an eco-certificate (see table four).

WTPrel. for a Kodak refurbished single use camera with an eco-certificate in comparison with WTPrel. for a Kodak refurbished single use camera without an eco-certificate shows a significant difference (Z=-4,708; ρ<0,001). Since the z-value is based on positive ranks, we can confirm the hypothesis in this case and say that respondents are WTPrel. more for Kodak refurbished single use camera with an eco-certificate compared to Kodak refurbished single use camera without an eco-certificate based on the mean rank differences.

For a Nokia refurbished cell phone, 75 respondents wanted to pay more for the branded and recycled product with an eco-certificate vs. non-certificated branded and recycled product. However, 26 respondents wanted to pay more for the regular branded product compared to the eco-certificated branded and recycled product. For 116 respondents, WTPrel. is the

same for the branded and recycled product with an eco-certificate vs. the branded and recycled product without an eco-certificate (see table four).

WTPrel. for a Nokia refurbished cell phone with an eco-certificate in comparison with WTPrel. for a Nokia refurbished cell phone without an eco-certificate shows a significant difference (Z=-4,410; ρ<0,001). Since the z-value is based on positive ranks, we can confirm the hypothesis in this case and say that respondents are WTPrel. more for a Nokia refurbished cell phone with an eco-certificate compared to a Nokia refurbished cell phone without an eco-certificate based on the mean rank differences.

For a HP printer containing reused parts, 60 respondents wanted to pay more for the branded and recycled product with an eco-certificate vs. non-certificated branded and recycled product. However, 24 respondents wanted to pay more for the branded and recycled product compared to the eco-certificated branded and recycled product. For 133 respondents, WTP is the same for the branded and recycled product with an eco-certificate vs. the branded product without an eco-certificate (see table four).

WTPrel. for a HP printer containing reused parts with an eco-certificate in comparison with WTPrel. for a HP printer containing reused parts without an eco-certificate shows a significant difference (Z=-3,694; ρ<0,001). Since the z-value is based on positive ranks, we can confirm the hypothesis in this case and say that respondents are WTPrel. more for a HP printer containing reused parts with an eco-certificate compared to a HP printer containing reused parts without an eco-certificate based on the mean rank differences.

For a refurbished HP toner cartridge, 77 respondents wanted to pay more for the branded and recycled product with an eco-certificate vs. non-certificated branded and recycled product. However, 18 respondents wanted to pay more for the branded and recycled product compared to the eco-certificated branded and recycled product. For 121 respondents, WTPrel. is the same for the branded and recycled product with an eco-certificate vs. the branded product without an eco-certificate (see table four).

WTPrel. for a refurbished HP toner cartridge with an eco-certificate in comparison with WTPrel. for a refurbished HP toner cartridge without an eco-certificate shows a significant difference (Z=-5,794; ρ<0,001). Since the z-value is based on positive ranks, we can confirm the hypothesis in this case and say that respondents are WTPrel. more for a refurbished HP toner cartridge with an eco-certificate compared to a refurbished HP toner cartridge without an eco-certificate based on the mean rank differences.

For a Michelin tire with recycled content, 61 respondents wanted to pay more for the branded and recycled product with an eco-certificate vs. non-certificated branded and recycled product. However, 32 respondents wanted to pay more for the branded and recycled product compared to the eco-certificated branded and recycled product. For 122 respondents, WTPrel. is the same for the branded and recycled product with an eco-certificate vs. branded product without an eco-certificate (see table four).

WTPrel. for a Michelin tire with recycled content and with an eco-certificate in comparison with WTPrel. for a Michelin tire with recycled content and without an eco-certificate shows a

significant difference (Z=-3,566; ρ<0,001). Since the z-value is based on positive ranks, we can confirm the hypothesis in this case and say that respondents are WTPrel. more for a Michelin tire with recycled content and with an eco-certificate compared to a Michelin tire with recycled content and without an eco-certificate based on the mean rank differences.

In general, we can say that this hypothesis is supported. All the six product pairs shows that respondents really want to pay more for products containing an eco-certificate vs. non-certificated products. So respondents really find it important that a sustainable practice has been followed during the production of a good.

The next step would be to look at the sample split for the second hypothesis. As mentioned earlier, the sample has been split in two groups, namely Business Administration vs. Engineering. The Business Administration group represents the bachelors International Business Administration and Business Administration, whereas the Engineering group represents the bachelors Industrial Design and Civil Engineering. In table five, the test statistic of the Wilcoxon signed rank test is presented based on the sample split. The rank scores can be found in appendix f.

(Table 5: Test statistic of the Wilcoxon signed rank test per branded product group based on a sample split)

	Business Administration		**Engineering**	
	Z	Asymp. Sig. (2-tailed)	Z	Asymp. Sig. (2-tailed)
WTP for Xerox white paper with recycled content - WTP for Xerox white recycled paper including an eco-certificate	-1,223a	0,221	-2,203a	0,028
WTP for a Kodak refurbished single use camera - WTP for a Kodak refurbished camera including an eco-certificate	-1,978a	0,048	-4,635a	0,000
WTP for a Nokia refurbished cell phone - WTP for a Nokia refurbished cell phone including an eco-certificate	-1,779a	0,075	-4,312a	0,000
WTP for a Hp printer containing reused parts - WTP for a Hp printer containing reused parts including an eco-certificate	-1,751a	0,080	-3,219a	0,001
WTP for a refurbished Hp toner cartridge - WTP for a Hp refurbished toner cartridge including an eco-certificate	-4,089a	0,000	-4,136a	0,000
WTP for a Michelin tire with recycled content - WTP for a Michelin tire with recycled content including an eco-certificate	-2,002a	0,045	-2,932a	0,003

a. Based on positive ranks
b. Based on negative ranks

Based on the test statistic of the Wilcoxon signed rank test of table five, the differences between the Group Business Administration and Engineering can be compared.

WTPrel. for Xerox white paper with recycled content vs. Xerox white recycled paper with an eco-certificate shows for the group Business Administration the following outcome: Z=-1,223; ρ=0,221; and for the group Engineering Z=-2,203; ρ=0,028. In this case, the group Business Administration achieves a different result than the group Engineering. For the group Business Administration, there is no significant difference comparing WTPrel. Xerox white paper with recycled content vs. Xerox white recycled paper with an eco-certificate. For the group Engineering however, there is a significant difference for the same tested variables.

WTPrel. for a Kodak refurbished single use camera vs. a Kodak refurbished camera including an eco-certificate shows for the group Business Administration the following outcome: Z=-0, 1,978; ρ=0,075; and for the group Engineering Z=-4,635; ρ<0,000. In this case, the group Business Administration achieves a different result than the group Engineering. For the group Business Administration, there is no significant difference comparing WTPrel. for a Kodak refurbished single use camera vs. a Kodak refurbished camera including an eco-certificate. For the group Engineering however, there is a significant difference for the same tested variables.

WTPrel. for a Nokia refurbished cell phone vs. a Nokia refurbished cell phone including an eco-certificate shows for the group Business Administration the following outcome: Z=-1,779; ρ=0,189; and for the group Engineering Z=-4,312; ρ<0,000. In this case, the group Business Administration achieves a different result than the group Engineering. For the group Business Administration, there is no significant difference comparing WTPrel. for a Nokia refurbished cell phone vs. a Nokia refurbished cell phone including an eco-certificate. For the group Engineering however, there is a significant difference for the same tested variables.

WTPrel. for a Hp printer containing reused parts vs. a Hp printer containing reused parts including an eco-certificate shows for the group Business Administration the following outcome: Z=-1,751; ρ=0,080; and for the group Engineering Z=-3,219; ρ=0,001. In this case, the group Business Administration achieves a different result than the group Engineering. For the group Business Administration, there is no significant difference comparing WTPrel. for a Hp printer containing reused parts vs. a Hp printer containing reused parts including an eco-certificate. For the group Engineering however, there is a significant difference for the same tested variables.

WTPrel. for a refurbished Hp toner cartridge vs. a Hp refurbished toner cartridge including an eco-certificate shows for the group Business Administration the following outcome: Z=-4,089; ρ<0,000; and for the group Engineering Z=-4,136; ρ<0,000. No real differences between the sampled groups can be detected.

WTPrel. for a Michelin tire with recycled content vs. a Michelin tire with recycled content including an eco-certificate shows for the group Business Administration the following outcome: Z=-2,002; ρ=0,045; and for the group Engineering Z=-2,932; ρ=0,003. In this case,

both groups (Business Administration and Engineering) show a significant difference comparing a regular Michelin tire with an Michelin tire with recycled content including an eco-certificate. However, for the group Business Administration, the significance level is close to the alpha level, so there is just a minor difference (ρ=0,045). For the group Engineering, there is a much bigger significant difference comparing the significance level to the alpha level (ρ=0,003).

In general, it can be said that for three product groups (Xerox white paper, Nokia cell phone and HP printer) sample split does influence the relation between the branded and recycled product vs. the branded and recycled product with an eco-certificate. It seems that for these three product groups, the group Engineering show a significant difference whereas the Business Administration group show no significant difference for the same compared product group with and without an eco-certificate.

IV. Hypothesis three

H3: Consumers WTP premium price with an eco-certificate is product specific.

The next step was to see whether the WTPrel. premium price with an eco-certificate is product specific (hypothesis three). This will be done by comparing the WTPrel. of the different branded certificated product categories. The main aim of this analysis is to see if consumer evaluations of branded and recycled products with an eco-certificate are influenced by the type of product. If consumers perceive a positive attitude towards certification, WTPrel. premium price will not be influenced by the product category, so it will be product specific.

(Table 6: Rank scores of the Wilcoxon signed rank test per certificated branded product group)

			N	Mean Rank	Sum of ranks	Z	Asymp. Sig. (2-tailed)
Pair 1	WTP for a Kodak refurbished camera including an eco-certificate - WTP for Xerox white paper including an eco-certificate	Negative ranks	39	29,33	1144,00	-3,839a	0,000
		Positive ranks	14	20,50	287,00		
		Ties	165				
		Total	218				
Pair 2	WTP for a Nokia refurbished cell phone including an eco-certificate - WTP for Xerox white paper including an eco-certificate	Negative ranks	60	45,68	2741,00	-4,833a	0,000
		Positive ranks	22	30,09	662,00		
		Ties	136				
		Total	218				
Pair 3	WTP for a Hp printer containing reused parts including an eco-certificate - WTP for Xerox white paper including an eco-certificate	Negative ranks	52	38,82	2018,50	-4,584a	0,000
		Positive ranks	18	25,92	466,50		
		Ties	148				
		Total	218				

			N	Mean Rank	Sum of ranks	Z	Asymp. Sig. (2-tailed)
Pair 4	WTP for a Hp refurbished toner cartridge including an eco-certificate - WTP for Xerox white paper including an eco-certificate	Negative ranks	52	35,50	1846,00	-5,428a	0,000
		Positive ranks	12	19,50	234,00		
		Ties	154				
		Total	218				
Pair 5	WTP for a Michelin tire with recycled content including an eco-certificate - WTP for Xerox white paper including an eco-certificate	Negative ranks	57	40,46	2306,00	-5,283a	0,000
		Positive ranks	16	24,69	395,00		
		Ties	145				
		Total	218				
Pair 6	WTP for a Nokia refurbished cell phone including an eco-certificate - WTP for a Kodak refurbished camera including an eco-certificate	Negative ranks	50	35,47	1773,50	-3,137a	0,002
		Positive ranks	20	35,58	711,50		
		Ties	148				
		Total	218				

			N	Mean Rank	Sum of ranks	Z	Asymp. Sig. (2-tailed)
Pair 7	WTP for a Hp printer containing reused parts including an eco-certificate - WTP for a Kodak refurbished camera including an eco-certificate	Negative ranks	35	28,06	982,00	-1,807a	0,071
		Positive ranks	20	27,90	558,00		
		Ties	163				
		Total	218				
Pair 8	WTP for a Hp refurbished toner cartridge including an eco-certificate - WTP for a Kodak refurbished camera including an eco-certificate	Negative ranks	42	33,52	1408,00	-2,770a	0,006
		Positive ranks	21	28,95	608,00		
		Ties	155				
		Total	218				
Pair 9	WTP for a Michelin tire with recycled content including an eco-certificate - WTP for a Kodak refurbished camera including an eco-certificate	Negative ranks	48	38,49	1847,50	-2,753a	0,006
		Positive ranks	25	34,14	853,50		
		Ties	145				
		Total	218				

			N	Mean Rank	Sum of ranks	Z	Asymp. Sig. (2-tailed)
Pair 10	WTP for a Hp printer containing reused parts including an eco-certificate - WTP for a Nokia refurbished cell phone including an eco-certificate	Negative ranks	24	26,23	629,50	-1,583b	0,114
		Positive ranks	33	31,02	1023,50		
		Ties	161				
		Total	218				
Pair 11	WTP for a Hp refurbished toner cartridge including an eco-certificate - WTP for a Nokia refurbished cell phone including an eco-certificate	Negative ranks	36	33,03	1189,00	-0,316b	0,752
		Positive ranks	34	38,12	1296,00		
		Ties	148				
		Total	218				
Pair 12	WTP for a Michelin tire with recycled content including an eco-certificate - WTP for a Nokia refurbished cell phone including an eco-certificate	Negative ranks	37	32,11	1188,00	-0,118b	0,906
		Positive ranks	32	38,34	1227,00		
		Ties	149				
		Total	218				

			N	Mean Rank	Sum of ranks	Z	Asymp. Sig. (2-tailed)
Pair 13	WTP for a Hp refurbished toner cartridge including an eco-certificate - WTP for a Hp printer containing reused parts including an eco-certificate	Negative ranks	32	25,67	821,50	1,219a	0,223
		Positive ranks	20	27,82	556,50		
		Ties	166				
		Total	218				
Pair 14	WTP for a Michelin tire with recycled content including an eco-certificate - WTP for a Hp printer containing reused parts including an eco-certificate	Negative ranks	43	39,06	1679,50	-1,829a	0,067
		Positive ranks	30	34,05	1021,50		
		Ties	145				
		Total	218				
Pair 15	WTP for a Michelin tire with recycled content including an eco-certificate - WTP for a Hp refurbished toner cartridge including an eco-certificate	Negative ranks	39	39,32	1533,50	-0,577a	0,564
		Positive ranks	36	36,57	1316,50		
		Ties	143				
		Total	218				

a. Based on positive ranks.
b. Based on negative ranks.

Table six presents all the fifteen possible pairs and their ranks from the six different product groups with an eco-certificate. The negative ranks represents the number of ranks were the respondents' WTPrel. of the first tested variable is bigger compared to the respondents' WTPrel. of the second variable. The positive ranks represents the number of ranks were the respondents' WTPrel. of the first tested variable is smaller compared to the respondents' WTPrel. of the second variable. The number of ties represent the situation where respondents did fill in the same value for WTPrel. of the first and second variable.

Table two six represents the test statistic of the Wilcoxon signed rank test per branded product group. The z-value represent the actual test statistic, and the two-tailed significant level indicates if there is a significant difference between the two tested certificated product groups.

Conclusions about the statistically significant value will be based on the alpha level (α=0,05). Per product group, the results for the hypothesis will be presented based on the statistics from table two.

Pair 1: For Xerox white recycled paper including an eco-certificate, 39 respondents wanted to pay more compared to a Kodak refurbished camera including an eco-certificate. However, 14 respondents wanted to pay more for a Kodak refurbished camera including an eco-certificate compared to Xerox white recycled paper including an eco-certificate. For 165 respondents, WTPrel. is the same for Xerox white recycled paper including an eco-certificate and a Kodak refurbished camera including an eco-certificate (see table six).

WTPrel. for Xerox white recycled paper including an eco-certificate in comparison with WTPrel. for a Kodak refurbished camera including an eco-certificate shows a significant difference (Z=-3,839) ; (ρ<0,001).

Pair 2: For Xerox white recycled paper including an eco-certificate, 60 respondents wanted to pay more compared to a Nokia refurbished cell phone including an eco-certificate. However, 22 respondents wanted to pay more for a Nokia refurbished cell phone including an eco-certificate compared to Xerox white recycled paper including an eco-certificate. For 136 respondents, WTPrel. is the same for Xerox white recycled paper including an eco-certificate and a Nokia refurbished cell phone including an eco-certificate (see table six).

WTPrel. for Xerox white recycled paper including an eco-certificate in comparison with WTPrel. for a Nokia refurbished cell phone including an eco-certificate shows a significant difference (Z=-4,833) ; (ρ<0,001).

Pair 3: For Xerox white recycled paper including an eco-certificate, 52 respondents wanted to pay more compared to a HP printer containing reused parts including an eco-certificate. However, 18 respondents wanted to pay more for a HP printer containing reused parts including an eco-certificate compared to Xerox white recycled paper including an eco-certificate. For 148 respondents, WTPrel. is the same for Xerox white recycled paper including an eco-certificate and a HP printer containing reused parts including an eco-certificate (see table six).

WTPrel. for Xerox white recycled paper including an eco-certificate in comparison with WTPrel. for a HP printer containing reused parts including an eco-certificate shows a significant difference (Z=-4,584) ; (ρ<0,001).

Pair 4: For Xerox white recycled paper including an eco-certificate, 52 respondents wanted to pay more compared to a HP refurbished toner cartridge including an eco-certificate. However, 12 respondents wanted to pay more for a HP refurbished toner cartridge including an eco-certificate compared to Xerox white recycled paper including an eco-certificate. For 154 respondents, WTPrel. is the same for Xerox white recycled paper including an eco-certificate and a HP refurbished toner cartridge including an eco-certificate (see table six).

WTPrel. for Xerox white recycled paper including an eco-certificate in comparison with WTPrel. for a HP refurbished toner cartridge including an eco-certificate shows a significant difference (Z=-5,428) ; (ρ<0,001).

Pair 5: For Xerox white recycled paper including an eco-certificate, 57 respondents wanted to pay more compared to a Michelin tire with recycled content including an eco-certificate. However, 16 respondents wanted to pay more for a Michelin tire with recycled content including an eco-certificate compared to Xerox white recycled paper including an eco-certificate. For 145 respondents, WTPrel. is the same for Xerox white recycled paper including an eco-certificate and a Michelin tire with recycled content including an eco-certificate (see table six).

WTPrel. for Xerox white recycled paper including an eco-certificate in comparison with WTPrel. for a Michelin tire with recycled content including an eco-certificate shows a significant difference (Z=-5,283) ; (ρ<0,001).

Pair 6: For a Kodak refurbished camera including an eco-certificate, 50 respondents wanted to pay more compared to a Nokia refurbished cell phone including an eco-certificate. However, 20 respondents wanted to pay more for a Nokia refurbished cell phone including an eco-certificate compared to a Kodak refurbished camera including an eco-certificate. For 148 respondents, WTPrel. is the same for a Kodak refurbished camera including an eco-certificate and a Nokia refurbished cell phone including an eco-certificate (see table six).

WTPrel. for a Kodak refurbished camera including an eco-certificate in comparison with WTPrel. for a Nokia refurbished cell phone including an eco-certificate shows a significant difference (Z=-3,137) ; (ρ=0,002).

Pair 7: For a Kodak refurbished camera including an eco-certificate, 35 respondents wanted to pay more compared to a HP printer containing reused parts including an eco-certificate. However, 20 respondents wanted to pay more for a HP printer containing reused parts including an eco-certificate compared to a Kodak refurbished camera including an eco-certificate. For 163 respondents, WTPrel. is the same for a Kodak refurbished camera including an eco-certificate and a HP printer containing reused parts including an eco-certificate (see table six).

WTPrel. for a Kodak refurbished camera including an eco-certificate in comparison with WTPrel. for a HP printer containing reused parts including an eco-certificate shows no significant difference (Z=-1,807) ; (ρ=0,071).

Pair 8: For a Kodak refurbished camera including an eco-certificate, 42 respondents wanted to pay more compared to a HP refurbished toner cartridge including an eco-certificate. However, 21 respondents wanted to pay more for a HP refurbished toner cartridge including an eco-certificate compared to a Kodak refurbished camera including an eco-certificate. For 155 respondents, WTPrel. is the same for a Kodak refurbished camera including an eco-certificate and a HP refurbished toner cartridge including an eco-certificate (see table six).

WTPrel. for a Kodak refurbished camera including an eco-certificate in comparison with WTPrel. for a HP refurbished toner cartridge including an eco-certificate shows a significant difference (Z=-2,770) ; (ρ=0,006).

Pair 9: For a Kodak refurbished camera including an eco-certificate, 48 respondents wanted to pay more compared to a Michelin tire with recycled content including an eco-certificate. However, 25 respondents wanted to pay more for a Michelin tire with recycled content including an eco-certificate compared to a Kodak refurbished camera including an eco-certificate. For 145 respondents, WTPrel. is the same for a Kodak refurbished camera including an eco-certificate and a Michelin tire with recycled content including an eco-certificate (see table six).

WTPrel. for a Kodak refurbished camera including an eco-certificate in comparison with WTPrel. for a Michelin tire with recycled content including an eco-certificate shows a significant difference (Z=-2,753) ; (ρ=0,006)

Pair 10: For a Nokia refurbished cell phone including an eco-certificate, 24 respondents wanted to pay more compared to a HP printer containing reused parts including an eco-certificate. However, 33 respondents wanted to pay more for a HP printer containing reused parts including an eco-certificate compared to a Nokia refurbished cell phone including an eco-certificate. For 161 respondents, WTPrel. is the same for a Nokia refurbished cell phone including an eco-certificate and a HP printer containing reused parts including an eco-certificate (see table six).

WTPrel. for a Nokia refurbished cell phone including an eco-certificate in comparison with WTPrel. for a HP printer containing reused parts including an eco-certificate shows no significant difference (Z=-1,583) ; (ρ=0,114).

Pair 11: For a Nokia refurbished cell phone including an eco-certificate, 36 respondents wanted to pay more compared to a HP refurbished toner cartridge including an eco-certificate. However, 34 respondents wanted to pay more for a HP refurbished toner cartridge including an eco-certificate compared to a Nokia refurbished cell phone including an eco-certificate. For 148 respondents, WTPrel. is the same for a Nokia refurbished cell phone including an eco-certificate and a HP refurbished toner cartridge including an eco-certificate (see table six).

WTPrel. for a Nokia refurbished cell phone including an eco-certificate in comparison with WTPrel. for a HP refurbished toner cartridge including an eco-certificate shows no significant difference (Z=-0,316) ; (ρ=0,752).

Pair 12: For a Nokia refurbished cell phone including an eco-certificate, 37 respondents wanted to pay more compared to a Michelin tire with recycled content including an eco-certificate. However, 32 respondents wanted to pay more for a Michelin tire with recycled content including an eco-certificate compared to a Nokia refurbished cell phone including an eco-certificate. For 149 respondents, WTPrel. is the same for a Nokia refurbished cell phone including an eco-certificate and a Michelin tire with recycled content including an eco-certificate (see table six).

WTPrel. for a Nokia refurbished cell phone including an eco-certificate in comparison with WTPrel. for a Michelin tire with recycled content including an eco-certificate shows no significant difference (Z=-0,118) ; (ρ=0,906).

Pair 13: For a HP printer containing reused parts including an eco-certificate, 32 respondents wanted to pay more compared to a HP refurbished toner cartridge including an eco-certificate. However, 20 respondents wanted to pay more for a HP refurbished toner cartridge including an eco-certificate compared to a HP printer containing reused parts including an eco-certificate. For 166 respondents, WTPrel. is the same for a HP printer containing reused parts including an eco-certificate and a HP refurbished toner cartridge including an eco-certificate (see table six).

WTPrel. for a HP printer containing reused parts including an eco-certificate in comparison with WTPrel. for a HP refurbished toner cartridge including an eco-certificate shows no significant difference (Z=-1,219) ; (ρ=0,223).

Pair 14: For a HP printer containing reused parts including an eco-certificate, 43 respondents wanted to pay more compared to a Michelin tire with recycled content including an eco-certificate. However, 30 respondents wanted to pay more for a Michelin tire with recycled content including an eco-certificate compared to a HP printer containing reused parts including an eco-certificate. For 145 respondents, WTPrel. is the same for a HP printer containing reused parts including an eco-certificate and a Michelin tire with recycled content including an eco-certificate (see table six).

WTPrel. for a HP printer containing reused parts including an eco-certificate in comparison with WTPrel. for a Michelin tire with recycled content including an eco-certificate shows no significant difference (Z=-1,829) ; (ρ=0,067).

Pair 15: For a HP refurbished toner cartridge including an eco-certificate, 39 respondents wanted to pay more compared to a Michelin tire with recycled content including an eco-certificate. However, 36 respondents wanted to pay more for a Michelin tire with recycled content including an eco-certificate compared to a HP refurbished toner cartridge including an eco-certificate. For 143 respondents, WTPrel. is the same for a HP refurbished toner cartridge including an eco-certificate and a Michelin tire with recycled content including an eco-certificate (see table six).

WTPrel. for a HP refurbished toner cartridge including an eco-certificate in comparison with WTPrel. for a Michelin tire with recycled content including an eco-certificate shows no significant difference (Z=-0,577) ; (ρ=0,564).

Based on the analysis, eight out of the possible fifteen pairs shows a statistically significant value, based on the alpha level (α=0,05). The analysis is executed by comparing each certificated product group with another certificated product group, which can be found in table six.

In general, we can say that this hypothesis is supported. Eight out of the possible fifteen pairs show a significant difference from each other based on the Wilcoxon signed rank test from table eight. What is interesting about this analysis is that Xerox white paper and a Kodak camera are the only product groups who seems to have an significant value compared to each of the other product groups (The only exception can be made for the comparison between the Kodak camera and the HP printer (ρ=0,071)). The other product groups however, does not present significant differences to each other.

The next step would be to look at the sample split for the third hypothesis. As mentioned earlier, the sample has been split in two groups, namely Business Administration vs. Engineering. The Business Administration group represents the bachelors International Business Administration and Business Administration, whereas the Engineering group represents the bachelors Industrial Design and Civil Engineering. In table seven, the test statistic of the Wilcoxon signed rank test is presented based on the sample split. The rank scores can be found in appendix f.

(Table 7: Wilcoxon signed rank test per branded product group based on a sample split)

		Business Administration		**Engineering**	
		Z	Asymp. Sig. (2-tailed)	Z	Asymp. Sig. (2-tailed)
Pair 1	WTP for a Kodak refurbished camera including an eco-certificate - WTP for Xerox white recycled paper including an eco-certificate	-1,040a	0,299	-3,994a	0,000
Pair 2	WTP for a Nokia refurbished cell phone including an eco-certificate - WTP for Xerox white recycled paper including an eco-certificate	-2,705a	0,007	-4,118a	0,000
Pair 3	WTP for a Hp printer containing reused parts including an eco-certificate - WTP for Xerox white recycled paper including an eco-certificate	-2,618a	0,009	-3,726a	0,000
Pair 4	WTP for a Hp refurbished toner cartridge including an eco-certificate - WTP for Xerox white recycled paper including an eco-certificate	-2,383a	0,017	-4,840a	0,000
Pair 5	WTP for a Michelin tire with recycled content including an eco-certificate - WTP for Xerox white recycled paper including an eco-certificate	-3,431a	0,001	-4,007a	0,000
Pair 6	WTP for a Nokia refurbished cell phone including an eco-certificate - WTP for a Kodak refurbished camera including an eco-certificate	-2,558a	0,011	-1,888a	0,059

		Business Administration		Engineering	
		Z	Asymp. Sig. (2-tailed)	Z	Asymp. Sig. (2-tailed)
Pair 7	WTP for a Hp printer containing reused parts including an eco-certificate - WTP for a Kodak refurbished camera including an eco-certificate	-1,962a	0,050	-0,433a	0,665
Pair 8	WTP for a Hp refurbished toner cartridge including an eco-certificate - WTP for a Kodak refurbished camera including an eco-certificate	-1,598a	0,110	-2,210a	0,027
Pair 9	WTP for a Michelin tire with recycled content including an eco-certificate - WTP for a Kodak refurbished camera including an eco-certificate	-2,691a	0,007	-1,246a	0,213
Pair 10	WTP for a Hp printer containing reused parts including an eco-certificate - WTP for a Nokia refurbished cell phone including an eco-certificate	-1,045b	0,296	-1,315b	0,189
Pair 11	WTP for a Hp refurbished toner cartridge including an eco-certificate - WTP for a Nokia refurbished cell phone including an eco-certificate	-0,899b	0,369	-0,471a	0,638
Pair 12	WTP for a Michelin tire with recycled content including an eco-certificate - WTP for a Nokia refurbished cell phone including an eco-certificate	0,089a	0,929	-0,337b	0,736

		Business Administration		Engineering	
		Z	Asymp. Sig. (2-tailed)	Z	Asymp. Sig. (2-tailed)
Pair 13	WTP for a Hp refurbished toner cartridge including an eco-certificate - WTP for a Hp printer containing reused parts including an eco-certificate	-0,281b	0,779	-1,803a	0,071
Pair 14	WTP for a Michelin tire with recycled content including an eco-certificate - WTP for a Hp printer containing reused parts including an eco-certificate	-1,828a	0,068	-0,893a	0,372
Pair 15	WTP for a Michelin tire with recycled content including an eco-certificate - WTP for a Hp refurbished toner cartridge including an eco-certificate	-1,556a	0,120	-0,774b	0,439

a. Based on positive ranks.
b. Based on negative ranks.

Based on the test statistic of the Wilcoxon signed rank test of table seven, the differences between the Group Business Administration and Engineering can be compared.

Pair 1: WTPrel. for a Kodak refurbished camera including an eco-certificate vs. WTPrel. for Xerox white recycled paper including an eco-certificate shows for the group Business Administration the following outcome: Z=-1,040; ρ=0,050; and for the group Engineering Z=-3,994; ρ<0,001. In this case, the group Business Administration achieves a different result than the group Engineering. For the group Business Administration, there is no significant difference. For the group Engineering however, there is a significant difference for the same tested variables.

Pair 2: WTPrel. a Nokia refurbished cell phone including an eco-certificate vs. WTPrel. for Xerox white recycled paper including an eco-certificate shows for the group Business Administration the following outcome: Z=-2,705; ρ=0,007; and for the group Engineering Z=-4,118; ρ<0,001. In this case, no significant differences occur executing a sample split.

Pair 3: WTPrel. for a Hp printer containing reused parts including an eco-certificate vs. WTPrel. for Xerox white recycled paper including an eco-certificate shows for the group Business Administration the following outcome: Z=-2,618; ρ=0,009; and for the group Engineering Z=-3,726; ρ<0,001. In this case, no significant differences occur executing a sample split.

Pair 4: WTPrel. for a Hp refurbished toner cartridge including an eco-certificate vs. WTPrel. for Xerox white recycled paper including an eco-certificate shows for the group Business Administration the following outcome: Z=-2,383; ρ=0,017; and for the group Engineering Z=-4,840; ρ<0,001. In this case, no significant differences occur executing a sample split.

Pair 5: WTPrel. for a Michelin tire with recycled content including an eco-certificate vs. WTPrel. for Xerox white recycled paper including an eco-certificate shows for the group Business Administration the following outcome: Z=-3,431; ρ=0,001; and for the group Engineering Z=-4,007; ρ<0,001. In this case, no significant differences occur executing a sample split.

Pair 6: WTPrel. for a Nokia refurbished cell phone including an eco-certificate vs. WTPrel. for a Kodak refurbished camera including an eco-certificate shows for the group Business Administration the following outcome: Z=-2,558; ρ=0,011; and for the group Engineering Z=-1,888; ρ=0,059. In this case, for the Business Administration group, the tested product groups give a significant difference. However, for the Engineering group, no significant difference is measured between the two tested product groups.

Pair 7: WTPrel. for a Hp printer containing reused parts including an eco-certificate vs. WTPrel. for a Kodak refurbished camera including an eco-certificate shows for the group Business Administration the following outcome: Z=-1,962; ρ=0,050; and for the group Engineering Z=-4,433; ρ=0,665. In this case, both sampled groups show no significant difference. However, the Business Administration group is close to achieve a significant difference comparing the two tested variables, whereas the group Engineering indicated that there is no significant difference between the tested variables.

Pair 8: WTPrel. for a Hp refurbished toner cartridge including an eco-certificate vs. WTPrel. for a Kodak refurbished camera including an eco-certificate shows for the group Business Administration the following outcome: Z=-1,598; ρ=0,110; and for the group Engineering Z=-2,210; ρ=0,027. In this case, the group Business Administration achieves a different result than the group Engineering. For the group Business Administration, there is no significant difference. For the group Engineering however, there is a significant difference for the same tested variables.

Pair 9: WTPrel. for a Michelin tire with recycled content including an eco-certificate vs. WTPrel. for a Kodak refurbished camera including an eco-certificate shows for the group Business Administration the following outcome: Z=-2,691; ρ=0,007; and for the group Engineering Z=-1,246; ρ=0,213. In this case, the group Business Administration achieves a different result than the group Engineering. For the group Business Administration, there is a significant difference. For the group Engineering however, there is no significant difference for the same tested variables.

Pair 10: WTPrel. for a Hp printer containing reused parts including an eco-certificate vs. WTPrel. for a Nokia refurbished cell phone including an eco-certificate shows for the group Business Administration the following outcome: Z=-1,045; ρ=0,296; and for the group Engineering Z=-1,312; ρ=0,189. In this case, no significant differences occur executing a sample split.

Pair 11: WTPrel. for a Hp refurbished toner cartridge including an eco-certificate vs. WTPrel. for a Nokia refurbished cell phone including an eco-certificate shows for the group Business Administration the following outcome: Z=-0,899; ρ=0,396; and for the group Engineering Z=-0,471; ρ=0,638. In this case, no significant differences occur executing a sample split.

Pair 12: WTPrel. for a Michelin tire with recycled content including an eco-certificate vs. WTPrel. for a Nokia refurbished cell phone including an eco-certificate shows for the group Business Administration the following outcome: Z=0,089; ρ=0,929; and for the group Engineering Z=-0,337; ρ=0,736. In this case, no significant differences occur executing a sample split.

Pair 13: WTPrel. for a Hp refurbished toner cartridge including an eco-certificate vs. WTPrel. for a Hp printer containing reused parts including an eco-certificate shows for the group Business Administration the following outcome: Z=-0,281; ρ=0,779; and for the group Engineering Z=-1,803; ρ=0,071. In this case, both sampled groups show no significant difference. However, the Engineering group is close to achieve a significant difference comparing the two tested variables, whereas the group Business Administration indicated that there is no significant difference between the tested variables.

Pair 14: WTPrel. for a Michelin tire with recycled content including an eco-certificate vs. WTPrel. for a Hp printer containing reused parts including an eco-certificate shows for the group Business Administration the following outcome: Z=-1,828; ρ=0,068; and for the group Engineering Z=-0,893; ρ=0,372. In this case, both sampled groups show no significant difference. However, the Business Administration group is close to achieve a significant difference comparing the two tested variables, whereas the group Engineering indicated that there is no significant difference between the tested variables.

Pair 15: WTPrel. for a Michelin tire with recycled content including an eco-certificate vs. WTPrel. for a Hp refurbished toner cartridge including an eco-certificate shows for the group Business Administration the following outcome: Z=-1,556; ρ=0,120; and for the group Engineering Z=-0,774; ρ=0,439. In this case, no significant differences occur executing a sample split.

In general, it can be concluded that for a sample split between the group Engineering and the group Business Administration only four compared variables show a different outcome of the test statistic at the alpha level. This is the case in pair 1, Pair 6, Pair 8 and Pair 9.

V. Hypothesis four

The last step was to look at the level of functional risk.

H4: The level of functional risk associated to the product category influences consumers' WTP a premium price between branded and recycled products with an eco-certificate and branded products containing recycled components.

Table six presents the outcome of the test statistic for this hypothesis. All the branded and recycled product groups with an eco-certificate are compared with each other. The data analysis is on the same way conducted as in the third hypothesis (a Wilcoxon signed rank test is used again). The difference compared to the third hypothesis is that here the level of functional risk will be compared between product groups.

Since in hypothesis three every different rank score is described and their significant values, for this hypothesis only a summary will be presented (because the same test and thus the same outcomes are conducted).
The following pairs show a significance difference measuring its WTP, that means that the ranked means of the certificated products are specific compared to each other: (all pairs do have an eco-certificate and recycled components).

- Xerox white paper vs. Kodak camera (Z=-3,839) ; (ρ<0,001)
- Xerox white paper vs. Nokia cell phone (Z=-4,833) ; (ρ<0,001)
- Xerox white paper vs. HP printer (Z=-4,584) ; (ρ<0,001)
- Xerox white paper vs. HP toner cartridge (Z=-5,428) ; (ρ<0,001)
- Xerox white paper vs. Michelin tire (Z=-5,283) ; (ρ<0,001)
- Kodak camera vs. Nokia cell phone (Z=-3,137) ; (ρ=0,002)
- Kodak camera vs. HP toner cartridge (Z=-2,770) ; (ρ=0,006)
- Kodak camera vs. Michelin tire (Z=-2,753) ; (ρ=0,006)

The following pairs show no significant difference by comparing the ranked means:

- Kodak camera vs. HP printer (Z=-1,807) ; (ρ=0,071)
- Nokia cell phone vs. HP printer (Z=-1,583) ; (ρ=0,114)
- Nokia cell phone vs. HP toner cartridge (Z=-0,316) ; (ρ=0,752)
- Nokia cell phone vs. Michelin tire (Z=-0,118) ; (ρ=0,906)
- HP printer vs. HP toner cartridge (Z=-1,219) ; (ρ=0,223)
- HP printer vs. Michelin tire (Z=-1,829) ; (ρ=0,067)
- HP toner cartridge vs. Michelin tire (Z=-0,577) ; (ρ=0,564)

The level of functional risk can influence WTP price premium for customers. In this case, the hypothesis for this assumption is supported for branded and recycled products with an eco-certificate. White paper is of low level of functional risk, compared to a toner cartridge of a tire. This also counts for a Kodak camera, which also has an relative low level of functional risk compared to an toner cartridge or a tire (Essoussi and Linton, 2010). In this case, respondents' WTP is the highest for Xerox white paper. The mean differences between Xerox white paper compared to all the other pairs show a high positive ranked mean difference (based on the filled in percentages how much respondents' WTP more or less for

a product), which resulted in a statistically significant outcome. This means that respondents are WTP more for Xerox white paper with an eco-certificate compared to the other products, because it is of lower functional risk.

As mentioned earlier, also the Kodak camera has an relative low level of functional risk (Essoussi and Linton, 2010). Comparing the Kodak camera with other product groups, they all show a significant positive difference, except the comparison between the Kodak camera and the HP printer. Comparing the Kodak camera with Xerox white paper results in a positive significant outcome for Xerox white paper. So respondents are WTP more for Kodak camera compared to the other product groups except Xerox white paper and a HP printer. This means that again that low functional risk influences WTP for recycled branded products with an eco-certificate.

All the other pairs show no statistical difference, so this means that a high level of functional risk (which is the case at the printer, the toner cartridge and the tire) results that WTP is not of statistically significant influence. So the level of risk is of influence on respondents' WTP.

Conducting a sample split, between the group Business Administration and the group Engineering, it gives a little different result. For the group Business Administration, there is no significant difference comparing Xerox white recycled paper with an eco-certificate compared to a Kodak refurbished camera with an eco-certificate. For the group Engineering however, there is a significance difference in comparing the same variables.
Also comparing a Nokia refurbished cell phone with an eco-certificate vs. a Kodak refurbished camera including an eco-certificate gives a different result executing a sample split. For the group Business Administration, there is a significant difference, however for the group Engineering there is no significant difference.
The final two tested pairs in which a sample split resulted in a significant difference were the comparison between HP refurbished toner cartridge including an eco-certificate vs. a Kodak refurbished camera including an eco-certificate and the Michelin tire with recycled content including an eco-certificate vs. a Kodak refurbished camera including an eco-certificate.

V. Discussion and conclusion

The final part of the project will be presented in this section. First the discussion of the results will be presented. Then, the conclusions will be presented for each hypothesis in order to give an answer on the main question. The third part contains of the limitations of current research and the report ends with a section about relevance for further research.

I. Discussion

This study provides insight in the bivariate relationship eco-certification on WTP. However, with regard to the consumer perspective, still limited information is resulting from this study. The motivation why customers want to pay a certain amount extra of money for an eco-certificated product compared to an non-certificated product is still open and discussable. It can be for instance an underlying reason that consumers feel more confident when an sustainable production of the good has been produced. Another motivation could be that consumers find it important that recycled products have an eco-certificate compared to regular products, because when purchasing a recycled product, they might feel more secure, or the recycled product may be perceived as more reliable with an eco-certificate.

As discussed in previous research, it is also discussable what the differences are between WTP and Willingness to accept, and the influence of marketing on this topic (Coursey et al. 1987). This study measured the WTP maximum price premium for the products of goods. But questions do arise, does the premium price in percentages filled in by consumers the real actual buying price for a certificated recycled and branded product? What is their actual purchasing behavior if they for example find certification important and are prepared to pay more for this, but in the shop they find out that the difference is to huge in their opinion, and they buy the cheaper variant, which is in this case the non-certificated product. How are consumers influenced by marketing communications or sales promotions? Does eco-certificated labeling on products influence consumers to pay more for these products, when they actually see that a sustainable practice has been set in the production of a good via an independent agency? All this marketing related questions are important and can be a determinant of WTP for eco-certificated products.

Another topic, similar to the study of Essoussi and Linton (2010), is the influence of branding on recycled product. Does branding influence WTP for environmentally products, or in this case on eco-certificated products? The brands from the questionnaire (which can be found in Appendix A), were selected based on the brand awareness under consumers tested by the Dutch Consumer Agency. This in other to prevent consumers that they do not know or are not familiar with the brand name. However, it can still be possible that consumers for some reason do not know the name of the brand, which can influences their WTP on the different brands.

The difference between the original survey from Canada about willingness to pay (Essoussi and Linton, 2010) and the survey held at the University of Twente is that different studies were chosen as sample. The Canadian version tested only three programs, Environmental Economics, Master in Business Administration and Environmental law (total response N=49).

Since the University of Twente does not offer programs like Environmental Economics and Environmental Law, it was decided that two other programs would be chosen in order to analyze the willingness to pay (Civil Engineering and Industrial Design). These two programs were chosen because they have interfaces with environmental issues, and are selected next to Business Administration (similar in the Canadian study) and International Business Administration. This can be of influence when the Canadian study will be compared to the Dutch study.

II. Conclusions

This study compared the relationship between eco-certification and the WTP for six different environmentally friendly product groups. The main research question of this research was: *Does eco-certification increase WTP for environmentally friendly products?*

The main important finding is that eco-certification does influence the relative WTP on recycled products. By comparing the absolute mean values of the standard price of a product group, the branding component seems to decrease for three products namely Xerox white paper, Kodak single use camera and a HP toner cartridge. However, consumers' WTP increases for three branded products, namely the Nokia cell phone, the HP printer and the Michelin car tire (table 1 of the results).

It seems that for all the product categories, except the white paper, adding a recycled component decreases the mean percentages of WTP from consumers. On the contrary, adding an recycled component to white paper, the consumers' WTP seems to further increase (table 1 of the results).

A very important conclusion is that by adding an eco-certificate on the recycled product, WTP seems to recover for all the product groups. For white paper consumers' WTP even further increases (table 1 of the results).

H1: The WTP is higher for branded and recycled products with an eco-certificate than for branded products without recycled components and eco-certificates.

This hypothesis tested the relationship between branded products and branded recycled products with an eco-certificate. A main conclusion of this analysis is that the hypothesis is not supported. Only one out from the possible six product groups show a significant positive relationship (Xerox white paper)

H2: The WTP is higher for branded and recycled products with an eco-certificate than for branded and recycled products without an eco-certificate.

This hypothesis tested the relationship by adding a recycled component towards the branded products, and see if this influences the relationship on branded and recycled products with an eco-certificate. A very unique finding is that for all the six product groups consumers' WTP more for products containing an eco-certificate. So consumers really find it important that a sustainable practice has been followed during the production of a good compared to the branded and recycled product.

H3: Consumers WTP premium price with an eco-certificate is product specific.

This hypothesis compared the relative WTP of the different branded certificated product categories with each other. The main aim of this analysis was to see if consumer evaluations of branded and recycled products with an eco-certificate are influenced by the type of product. If consumers perceive a positive attitude towards certification, WTP premium price

will not be influenced by the product category, so in that case it would be product specific. Results indicated that WTP price premium of branded and recycled products with an eco-certificate is product specific. All the six product groups were compared with each other, and eight out of the possible fifteen pairs were significant different from each other.

H4: The level of functional risk associated to the product category influences consumers' WTP a premium price between branded and recycled products with an eco-certificate and branded products containing recycled components.

This hypothesis tested if the level of functional risk influences consumers' WTP on the six certificated product groups. The level of functional risk influences WTP for eco-certificated products. The lower the level of functional risk, the more consumers are WTP for eco-certificated products compared to the products with a higher level of risk. For Xerox recycled white paper with an eco-certificate, (associated with low level of risk) consumers are significantly WTP more compared to the products with a high level of functional risk, like for example the Michelin tire with recycled content and an eco-certificate. The mean difference between Xerox white paper (which has a mean of 1,67) and Michelin (which has a mean of -2,52) are significantly different from each other based on the results from the Wilcoxon signed rank test.

The interesting part was that only the combinations from product groups with Xerox white paper or a Kodak refurbished camera shows a significant difference. This suggests that the level of functional risk comes along for WTP on products since Xerox white paper and a Kodak refurbished camera are perceived as having a low level of functional risk compared to the other product groups. Between products containing high level of functional risk (for example a Michelin retreaded tire or a HP toner cartridge) no statistical significant difference was found. So the perceived functional risk for customers is of influence in purchase decisions for consumers, despite the argument that eco-certification can create the feeling for consumers that a high level of functional risk can be reduced via eco-certificated production of a product.

One of the reasons why the level of functional risk comes along on WTP for eco-certificated products is that a high level of functional risk may cause harm to consumers, besides the fact that the level of harm was trying to be reduced via an eco-certificate, which should result in the feeling for consumers that they have more trust in the product.

The last concluding remark is that a sample split was conducted between the bachelors International Business Administration and Business Administration (Group Business Administration) and Industrial Design and Civil Engineering (Group Engineering). For the first hypothesis, only one variable (Michelin tire) had a significant different value comparing the sampled groups. For the second hypothesis, this increases into three product groups (Xerox white paper, Nokia cell phone and HP printer) in which a sample split does influence the relation between the branded and recycled product vs. the branded and recycled product with an eco-certificate. In hypothesis three and four, only four of the fifteen product groups seems to be significant different comparing the group Business Administration and the Group Engineering.

III. Limitations of current research

This study only measured the direct relationship between recycled branded products with an eco-certificate vs. non-certification via bivariate analysis. So this means that not the similar study was conducted as in the original study of Essoussi and Linton (2010), where WTP was compared between recycled and regular products. This study is more an extension based on the study of Essoussi and Linton (2010) were the influence of eco-certification on WTP is measured. It is also limited because if other variables partially explains WTP.

Another limitation is that the questionnaire was set out under two different bachelor programs in comparison with the research in Canada, since the bachelors Environmental law and Environmental economics are not applicable at the University of Twente.

Only 230 bachelor students from four different bachelor programs filled in the questionnaire, but because the exact population number of bachelor students are not been available or published, it is impossible to make generalizations about bachelor students.

The last limitation was that although respondents were asked how knowledgeable they are about the different brands, brand awareness was not taken in consideration when analyzing the data.

IV. Relevance for further research

This research tested the relationship from eco-certification on WTP for environmentally friendly branded products. It took an initially step in analyzing whether eco-certification is of significant influence. The next step would be to look for more arguments why consumers want to pay a price premium for eco-certificated products. As earlier mentioned, it can be the case that consumers find it more important when a sustainable production of an good was conducted during the process of a good by an individual agency.

Another interesting related research topic is to analyze per product brand or group in which way eco-certification plays an role to recycled products. An extensive case study for a company of one of the products can be an example to see if eco-certification is of benefit and can increase benefits for the companies and for their consumers. It also gives the option to further investigate the role of eco-certification on WTP for environmentally friendly products especially for the customers for that product brand or group. It is then also possible to investigate whether marketing communications, sales promotions etc. influences WTP with an eco-certificate.

The last interesting advise can be to see whether psychological circumstances can be of influence on WTP. This can for example be done via a laboratory investigation, were for example the actual moment of purchasing a good or product can be reordered. An experiment and a control group could be assigned to see if consumers purchases the regular, recycled or the eco-certificated variant of the product, under certain prices. Also branding can play a role, in which for example the control group can purchase an A-brand which is very well known, and the experiment group can purchase a relative unknown brand. It can then be tested how high WTP is for the product, to see if branding plays an role in the whole story.

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Appendix A: Survey

uOttawa

École de gestion
School of Management

This survey has been developed by Professors at the Telfer School of Management for research purposes and approved by the Ethics and Grants Services. The results are strictly confidential and will be used to compute quantitative data regarding the consumption of recycled products. Thank you in advance for your time and input.

1- For the following questions, please circle the number corresponding to your answer:

How often do you use recycled products?

Never 1---2---3---4---5---6---7 Constantly

How familiar do you consider yourself with recycled products?

Unfamiliar 1---2---3---4---5---6---7 Very familiar

How much of a recycled product expert would you call yourself?

Not at all expert 1---2---3---4---5---6---7 Extremely expert

2- Please indicate how much you agree/disagree with the following statements:

	Strongly disagree	Disagree	Disagree a little	Neither agree nor disagree	Agree a little	Agree	Strongly agree
I am interested in recycled products in general.							
Recycled products are important to me.							
I am aware of which recycled products I use.							
Recycled products are relevant to my life.							
I am going to purchase recycled products in the next six months.							

3- Please indicate how much you know about the following elements using the following scale (circle the number that corresponds to your response):

Know nothing about 1-----2-----3-----4-----5-----6-----7 Know a great deal about

Acid rain	1-----2-----3-----4-----5----6----7
Water pollution	1-----2-----3-----4-----5----6----7
Air pollution	1-----2-----3-----4-----5----6----7
Global warming	1-----2-----3-----4-----5----6----7
Ozone layer depletion (in dutch: uitputting)	1-----2-----3-----4-----5----6----7
Destruction of the rain forest	1-----2-----3-----4-----5----6----7
Pollution from pesticides/insecticides	1-----2-----3-----4-----5----6----7

4- For the following statements, please circle the number corresponding to your answer:

Recycled paper should be of:	Very low quality	1----2----3----4----5----6----7	Very high quality
A recycled single use camera should be of:	Very low quality	1----2----3----4----5----6----7	Very high quality
A recycled toner cartridge should be of:	Very low quality	1----2----3----4----5----6----7	Very high quality
A recycled cell phone should be of:	Very low quality	1----2----3----4----5----6----7	Very high quality
A recycled printer should be of:	Very low quality	1----2----3----4----5----6----7	Very high quality
A recycled retreaded[1] tire should be of:	Very low quality	1----2----3----4----5----6----7	Very high quality

5- Please indicate how knowledgeable you are of the following brands:

Xerox	Not at all knowledgeable	1----2----3----4----5----6----7	Very knowledgeable
Kodak	Not at all knowledgeable	1----2----3----4----5----6----7	Very knowledgeable
HP	Not at all knowledgeable	1----2----3----4----5----6----7	Very knowledgeable
Nokia	Not at all knowledgeable	1----2----3----4----5----6----7	Very knowledgeable
Michelin	Not at all knowledgeable	1----2----3----4----5----6----7	Very knowledgeable

6- For the following statements, please circle the number corresponding to your answer:

Xerox white paper is of:	Very low quality	1----2----3----4----5----6----7	Very high quality
Kodak single use cameras are of:	Very low quality	1----2----3----4----5----6----7	Very high quality
HP toner cartridges are of:	Very low quality	1----2----3----4----5----6----7	Very high quality
Nokia cell phones are of:	Very low quality	1----2----3----4----5----6----7	Very high quality
HP printers are of:	Very low quality	1----2----3----4----5----6----7	Very high quality
Michelin retreaded tires are of:	Very low quality	1----2----3----4----5----6----7	Very high quality

[1] A Retreaded tire = Dit gebeurt wanneer alleen het loopvlak van de band alleen wordt vernieuwd, het voordeel hiervan is dat je geen nieuwe banden hoeft aan te schaffen.

7- Willingness to pay:

We would like for you to value the attractiveness of purchasing the following environmentally friendly products over their standard counterparts.

A- Assuming that the regular price of white paper for use in a photocopier/printer is €10, how much would you be willing to pay:

For white paper with recycled content:	☐ An extra _____% ☐ The same amount (€10) ☐ Less than €10, by _____%
For **regular Xerox** white paper:	☐ An extra _____% ☐ The same amount (€10) ☐ Less than €10, by _____%
For **Xerox** white paper with **recycled content**:	☐ An extra _____% ☐ The same amount (€10) ☐ Less than €10, by _____%

B- Assuming that the regular price of single use (disposable) cameras is €10, how much would you be willing to pay:

For refurbished (=Gerenoveerd) single use camera:	☐ An extra _____% ☐ The same amount (€10) ☐ Less than €10, by _____%
For a **regular Kodak** single use camera:	☐ An extra _____% ☐ The same amount (€10) ☐ Less than €10, by _____%
For a **Kodak refurbished** (=Gerenoveerd) single use camera:	☐ An extra _____% ☐ The same amount (€10) ☐ Less than €10, by _____%

C- Assuming that the regular price of a cell phone is €100, how much would you be willing to pay:

For a refurbished (=Gerenoveerd) cell phone:	☐ An extra _____% ☐ The same amount (€100) ☐ Less than €100, by _____%
For a **regular Nokia** cell phone:	☐ An extra _____% ☐ The same amount (€100) ☐ Less than €100, by _____%
For a **Nokia refurbished** (=Gerenoveerd) cell phone:	☐ An extra _____% ☐ The same amount (€100) ☐ Less than €100, by _____%

D- Assuming that the regular price of a computer printer is €100, how much would you be willing to pay:

For a printer containing reused parts:	☐ An extra _____% ☐ The same amount (€100) ☐ Less than €100, by _____%
For a **regular HP** printer:	☐ An extra _____% ☐ The same amount (€100) ☐ Less than €100, by _____%
For a **HP** printer containing **reused parts**:	☐ An extra _____% ☐ The same amount (€100) ☐ Less than €100, by _____%

E- Assuming that the regular price of a toner cartridge is €50, how much would you be willing to pay:

For a **refurbished** (=Gerenoveerd) toner cartridge:	☐ An extra _____% ☐ The same amount (€50) ☐ Less than €50, by _____%
For a **regular HP** toner cartridge:	☐ An extra _____% ☐ The same amount (€50) ☐ Less than €50, by _____%
For a **refurbished** (=Gerenoveerd) **HP** toner cartridge:	☐ An extra _____% ☐ The same amount (€50) ☐ Less than €50, by _____%

F- Assuming that the regular price of a tire is €100, how much would you be willing to pay:

For a tire with **recycled** content:	☐ An extra _____% ☐ The same amount (€100) ☐ Less than €100, by _____%
For a **regular Michelin** tire:	☐ An extra _____% ☐ The same amount (€100) ☐ Less than €100, by _____%
For a **Michelin tire** with **recycled content**:	☐ An extra _____% ☐ The same amount (€100) ☐ Less than €100, by _____%

8- Please indicate how much you agree/disagree with the following statements:

	Strongly disagree	Disagree	Disagree a little	Neither ... Nor	Agree a little	Agree	Strongly agree
The environment is one of the most important issues facing society today							
We should pay a considerable amount of money to preserve our environment							
Strict global measures must be taken immediately to halt environmental decline							
A substantial amount of money should be devoted to environmental protection							
Unless each of us recognizes the need to protect the environment, future generations will suffer the consequences							
The benefit of protecting the environment do not justify the expense involved							
The environmental policies of the main political parties are one issue I consider when deciding how to vote							

9- Please indicate how much you agree/disagree with the following statements:

	Strongly disagree	Disagree	Disagree a little	Neither ... Nor	Agree a little	Agree	Strongly agree
Using a recycled product is risky							
Recycled products can lead to bad results							
Using recycled products can yield uncertain outcomes							
Using a recycled product makes me feel anxious							
Using a recycled product would cause me to worry.							

10 YOUR PROFILE

GENDER: □ *male* □ *female*

AGE: _____ **YEARS**

NATIONALITY	**ETHNIC ORIGIN**
□ *Dutch* □ *German* □ *Other (Please Specify: _____)*	□ *North-American* □ *Arab* □ *African* □ *European* □ *Oceanic European* □ *Asian* □ *South-American* □ *Other (e.g. parents from different origin), please specify :_____*

(Please fill in both Nationality and Ethnic Origin)

ANNUAL HOUSEHOLD INCOME (PARENTS)

- □ *€0 - €15,000*
- □ *€15,000 - €29,999*
- □ *€30,000 - €49,999*
- □ *€50,000 – €69,999*
- □ *€70,000 – 99,999*
- □ *€100,000 +*

11- Willingness to pay, part two:

We would like for you to value the attractiveness of purchasing the following environmentally friendly products over their standard counterparts. We compare a regular product with one that has an independent certificate: An independent agency tests and certifies that sustainable practices have been followed in the production of the good.

A- Assuming that the regular price of regular white paper for use in a photocopier/printer is €10, how much would you be willing to pay:

For a **Xerox** white **recycled paper** content, **including an eco-certificate**:	☐ An extra _____% ☐ The same amount (€10) ☐ Less than €10, by _____%

B- Assuming that the regular price of single use (disposable) cameras is €10, how much would you be willing to pay:

For a **Kodak refurbished** single use camera, **including an eco-certificate**:	☐ An extra _____% ☐ The same amount (€10) ☐ Less than €10, by _____%

C- Assuming that the regular price of a cell phone is €100, how much would you be willing to pay:

For a **Nokia refurbished** cell phone, **including an eco-certificate**:	☐ An extra _____% ☐ The same amount (€100) ☐ Less than €100, by _____%

D- Assuming that the regular price of a computer printer is €100, how much would you be willing to pay:

For a **HP** printer containing **reused parts**, **including an eco-certificate**:	☐ An extra _____% ☐ The same amount (€100) ☐ Less than €100, by _____%

E- Assuming that the regular price of a toner cartridge is €50, how much would you be willing to pay:

For a **HP refurbished** toner cartridge, **including an eco-certificate**:	☐ An extra _____% ☐ The same amount (€50) ☐ Less than €50, by _____%

F- Assuming that the regular price of a tire is €100, how much would you be willing to pay:
For a tire with **recycled** content:

For a **Michelin** tire with **recycled content**, **including an eco-certificate**:	☐ An extra _____% ☐ The same amount (€100) ☐ Less than €100, by _____%

For the final question, please circle the number corresponding to your answer:

How important is it for you that recycled products should have a eco-certificate?

Not important 1---2---3---4---5---6---7 Very important

THANK YOU VERY MUCH FOR YOUR COLLABORATION

Appendix B: Missing value analysis

The missing value analysis presents the missing count of the items of the eco-certificated product groups. As it can be analyzed in the univariate statistics, a total of 12 respondents were for some reason unable to fill in the questionnaire for each scale item. This means that more than 5 per cent did not fill in the questions about eco-certification.

(Table A: Univariate statistics of the eco-certificated products)

	N	Mean	Std. Deviation	Missing count	Missing percentage	No. of extremes low (A)	No. of extremes high (A)
XEROXECO	218	1,67	9,684	12	5,2	9	7
KODAKECO	218	-0,65	13,457	12	5,2		
NOKIAECO	218	-2,38	15,354	12	5,2	42	54
PRINTECO	218	-1,49	14,253	12	5,2		
CARTECO	218	-1,98	13,803	12	5,2		
MICHECO	218	-2,52	16,094	12	5,2	37	54

(A): Number of cases outside the range (Q1 - 1.5*IQR, Q3 + 1.5*IQR).

Looking at table B, when running the Little's MCAR (Missing Completely at Random) test, it was found that data was not missing completely random (α=0,000).

(Table B: Little's MCAR test for the certificated product groups)

EM Means (A)

XEROXECO	KODAKECO	NOKIAECO	PRINTECO	CARTECO	MICHECO
1,67	-0,65	-2,38	-1,49	-1,98	-2,52

(A): Little's MCAR test: Chi-Square = ,000, DF = 0, Sig. = .

Appendix C: Measurement criteria

This section provides some extra measurement criteria, as some thought for conceptualize the relation between eco-certification and WTP for environmentally friendly products.

"Operationalization is the development of specific research procedures (operations) that will result in empirical observations representing those concepts in the real world" (Babbie, 2010, p. 146).
In operationalization it is first important to decide what the range of variation of the concept is. Then the degree of precision will be decided among the attributes of the variables. After that, the measurement level will be decided for the compared variables. Finally, a critical insight will be presented towards reliability and validity (Babbie, 2007).

The main goal of this research is that an interest in environmental concerns appears to lead to the feeling that environmental certification is important. In order to give an answer to this research goal, first the relationship between two variables will be analyzed. We want to see whether and in which way eco-certification can influence the willingness to pay for environmentally friendly products. In order to execute this analysis, the willingness to pay for environmentally products will be compared with the willingness to pay for certificated environmentally products.

We assume that eco-certification has an positive relationship on the willingness to pay for the six different product groups, and has an positive outcome that eco-certificate products are preferable for the respondent. This means that people want to pay more for certificated environmentally friendly products than for products without an certificate. The main argumentation behind this idea is that consumers who have environmentally interests, will find it more important that sustainable practices have been followed in the production of a good. This will result in the feeling that consumers are willing to pay more for certificated environmentally friendly products.

The second consideration in operationalization is the degree of precision (Babbie, 2007). How fine can the distinctions be made among the possible attributes of the different variables. Next to the relation compared between willingness to pay for environmental products with an without eco-certification, it is important to see whether other variables or attributes influence or explain this relationship.

The most important attribute that will be used is similar to the Canadian study (Essoussi and Linton, 2010). The differences between the six products will be compared by looking at the type of product compared to the associated risk. The main argumentation by analyzing this variable is that the level of risk is encountered by consumers when taking purchase decisions (Essoussi and Linton, 2010). It is therefore essential to take product risk into consideration when describing the relation between willingness to pay for environmentally friendly products with and without the an eco-certificate. It can be for example the case that a retreaded tire may have a high level risk compared to a low level of risk by purchasing white paper.

The first step would be to quantify whether the willingness to pay price premium is product specific. By price premium is meant, the excess price paid over the fair price, which is justified by the real value of the product (Essoussi and Linton, 2010). This will be done by comparing the willingness to pay of all six eco-certificated products with each other. In this way it can be measured whether there is a relationship between the products, and if not, we can formulate whether the willingness to pay price premium for certificated products are product specific.

The next step would be to analyze whether the level of functional risk influences the willingness to pay for environmentally friendly certificated products. As mentioned earlier, purchase decisions from customers depend on the level of risk of the associated product (Essoussi and Linton, 2010). It was found that consumers are willing to pay more for low risk products, like a single use camera or white paper compared to high risk products like a retreaded tire (Essoussi and Linton, 2010). It would be nice to see whether this also influences the willingness to pay for environmentally friendly products with an eco-certificate.

For operationalization it is also crucial to look at the measurement level of the variables (Babbie, 2007). As mentioned earlier, first the willingness to pay for environmentally friendly certificated products will be compared with the willingness to pay for environmentally friendly products without a certificate. Next, the willingness to pay price premium of certificated products will be compared between the different certificated products, and finally the level of functional risk for willingness to pay for certificated products will be compared with each other, and see whether this correspondence with the Canadian study about Willingness to pay.

All the compared variables cover the items of willingness to pay, since this will be compared for each variable. These variables have an interval ratio, since in contrasting with ratio measures, the attributes do not have a zero point. Also negative percentages in the willingness to pay can be possible, so there is no zero point. The advantage of interval measures is that the actual distances between the percentages does have a meaning (Babbie, 2007). It is possible when comparing for example two percentages, to state that "they are different from another (nominal), and that one is more than another, and in addition how much more"(Babbie, 2007, p. 136).

For operationalization, it is important to look at the criteria of measurement quality. First, it is important to check reliability, which is "a matter of whether a particular technique, applied repeatedly to the same object, yields the same result each time" (Babbie, 2007, p. 140). First, the questionnaire was tested among two students (one student graduated in bachelor of Tourism Management, and one student in his final year of the Master Business Administration), to see whether questions were understandable, especially questions related to certification. No significant errors occurred during these tests.

The second argument to increase reliability is that the measures have proven their reliability in previous research. The survey was originated and tested in Canada (Essoussi and Linton, 2010) which looked critically at the methodology and reliability of the survey.

A third and last argument to increase reliability is that all questionnaires were coded uniquely, so if there are any questions regarding the outcomes of the respondents answers, it can be checked.

The last step in operationalization will be to look at validity, which "refers to the extent to which an empirical measure adequately reflects the real meaning of the concept under consideration" (Babbie, 2007, p.143). So it is important to state whether you measuring what you intend to measure. The next sections show different kinds of validity tested among the variables.

Face validity refers to the quality of an indicator, which is a reasonable measure of a variable (Babbie, 2007). So the percentage which people are willing to pay extra or less seems fairly to be a good representation for environmentally friendly certificated products.

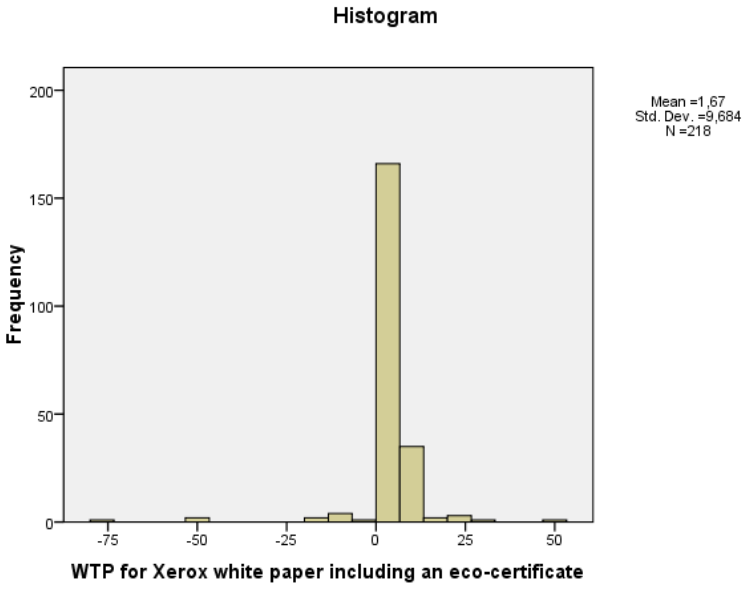
"Criterion-related validity refers to the degree to which a measure relates to some external criterion" (Babbie, 2007, p. 144). This is covered since we actually want to measure what respondents want to pay for environmentally friendly certificated products. We can predict the willingness to pay for environmentally friendly certificated products since respondents fill in the percentage that they want to pay more or less when a certificated product has an certain value in Euro's.

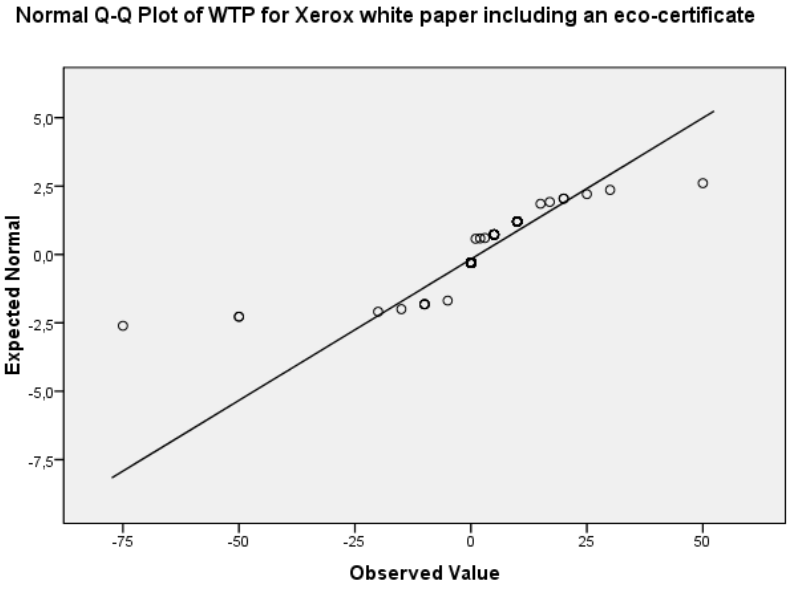
Construct validity is based on the logical relationship among variables (Babbie, 2007). It looks at "the degree a measure relates to other variables as expected within a theory of relationships"(Babbie, 2007, p.144). Threats to construct validity will be tried to minimized by not only measuring the willingness to pay for environmentally friendly certificated products, but also look at the relationship between the type of product and the level of functional risk. The level of functional risk (high vs. low) may influence the willingness to pay for environmentally friendly certificated products. By analyzing the level of functional risk, the validity of the relationship between environmentally friendly certificated products can be increased.

Appendix D: Normality check for distributions

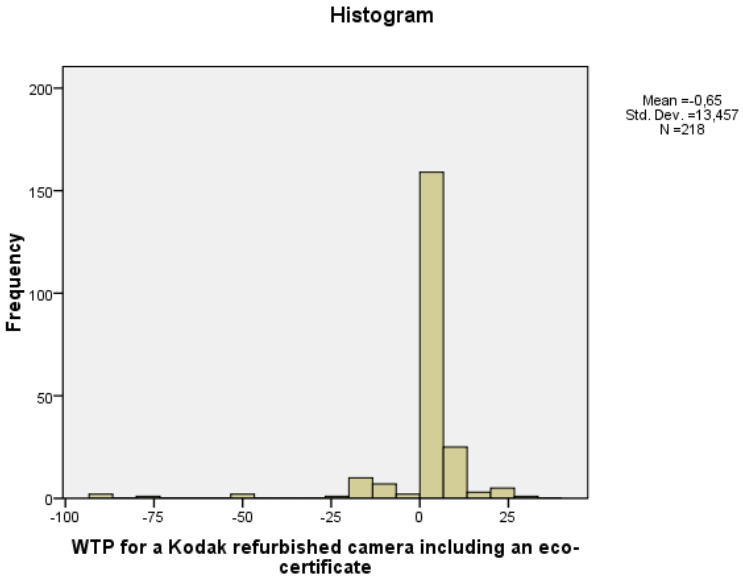
This appendix presents the histograms and the normal q-q plots for all the certificated product groups.

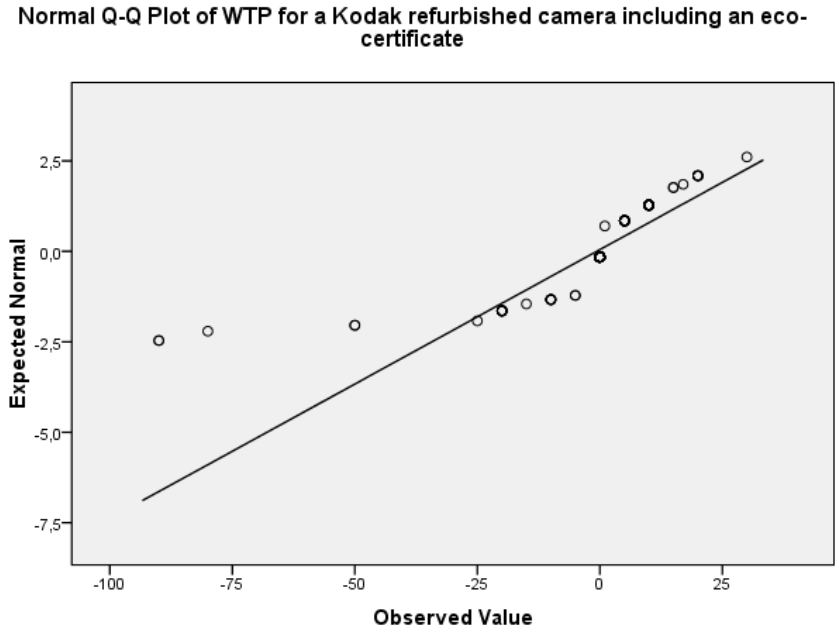
Xerox white recycled paper with an eco-certificate



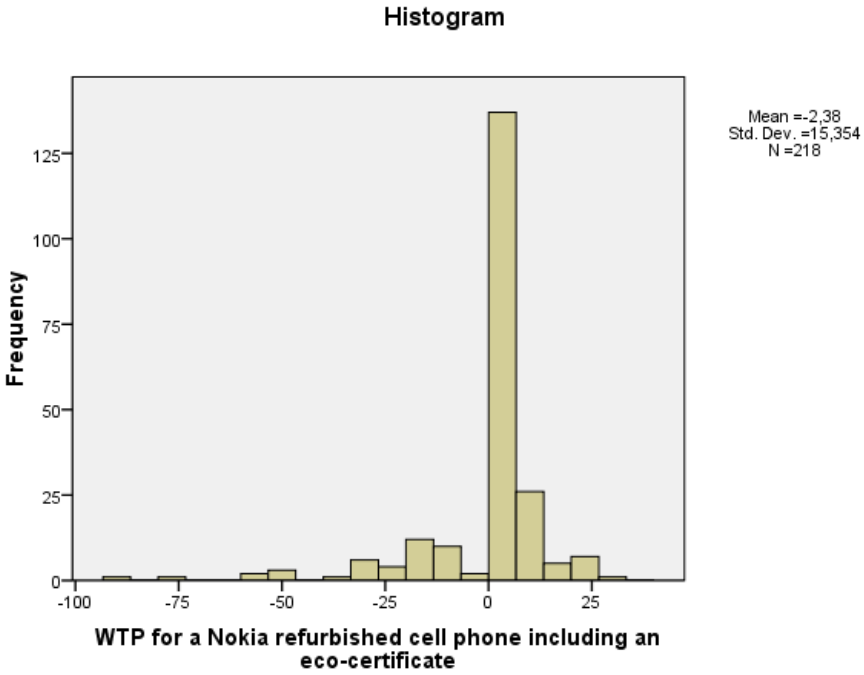


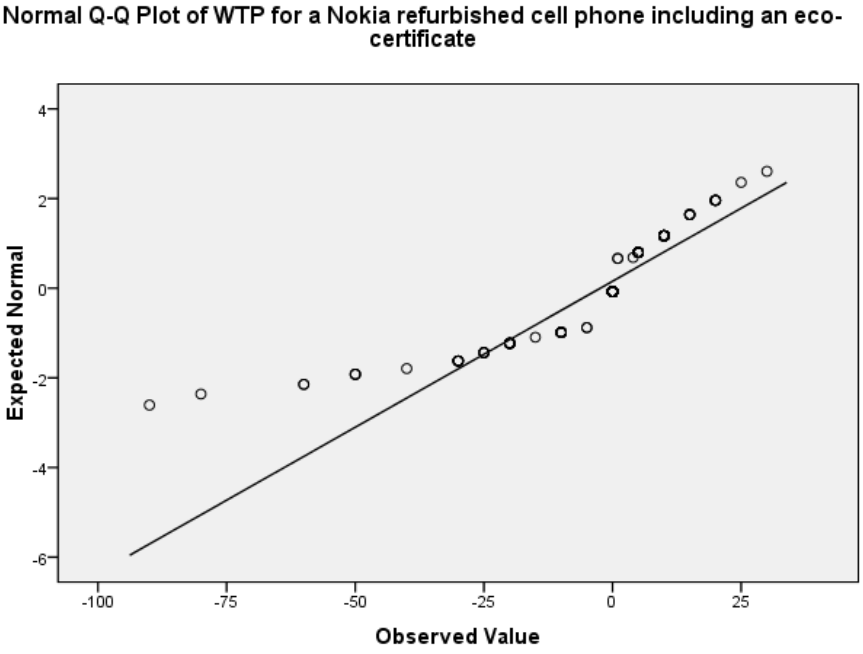
Kodak refurbished single use camera with an eco-certificate



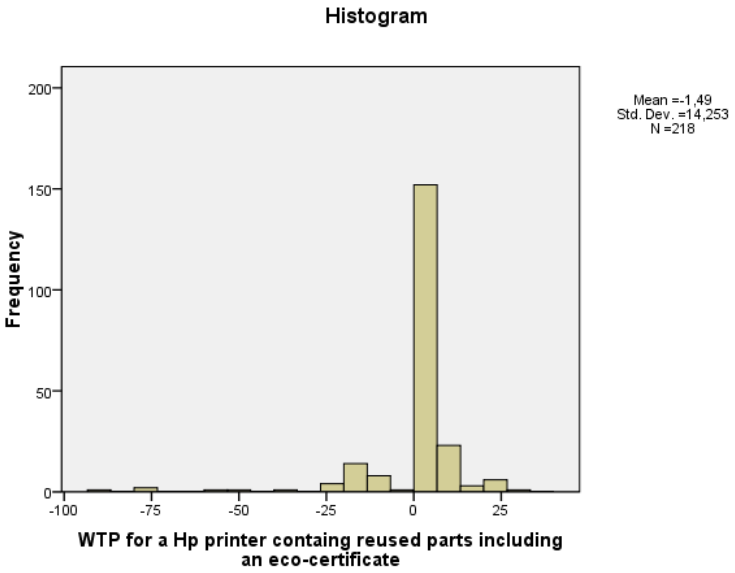


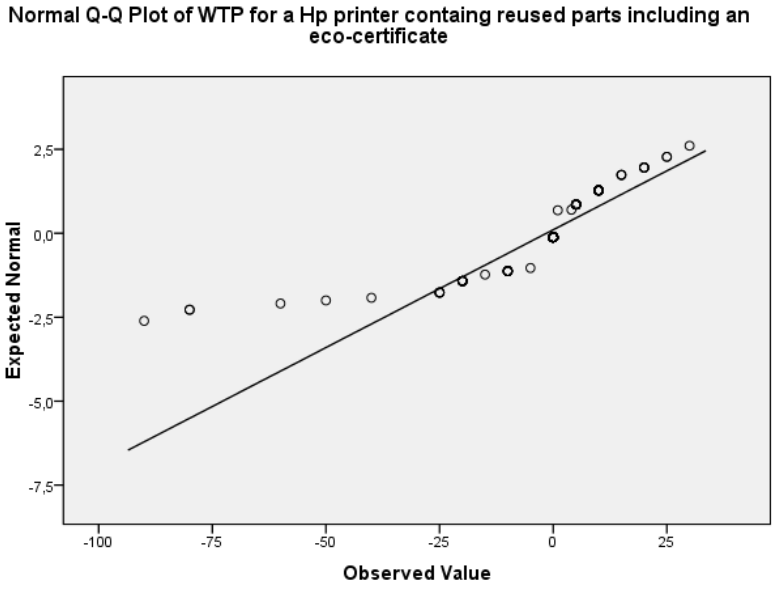
Nokia refurbished cell phone with an eco-certificate



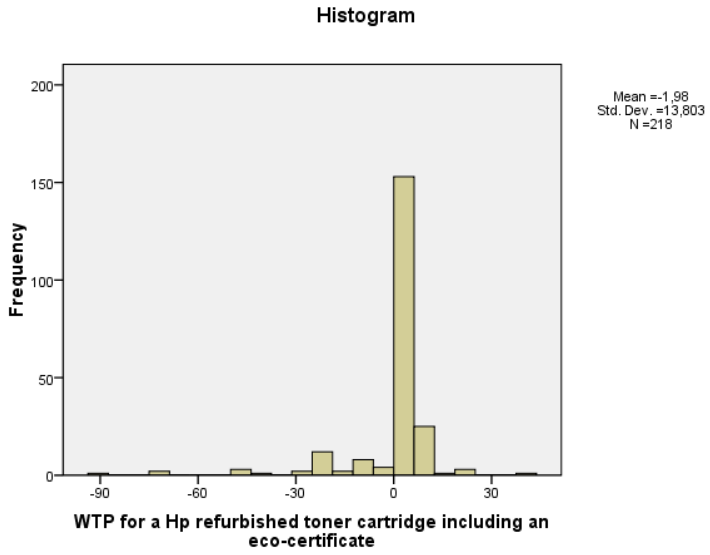


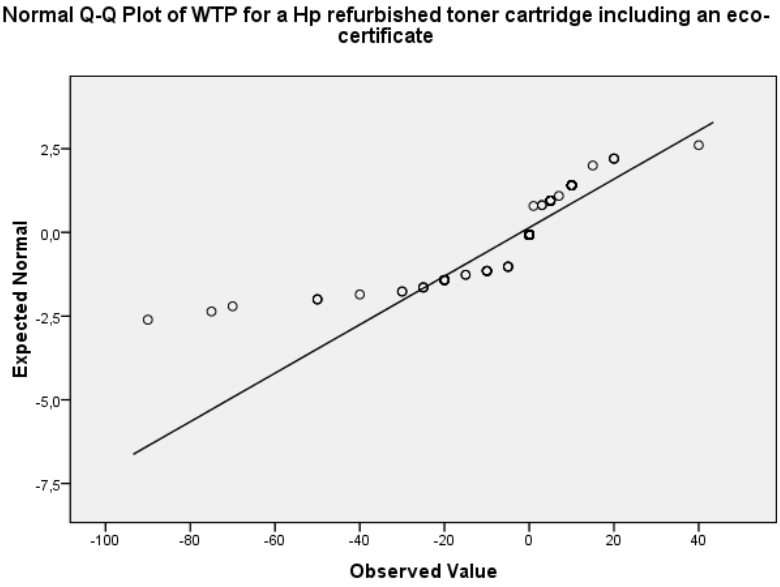
HP printer containing reused parts with an eco-certificate



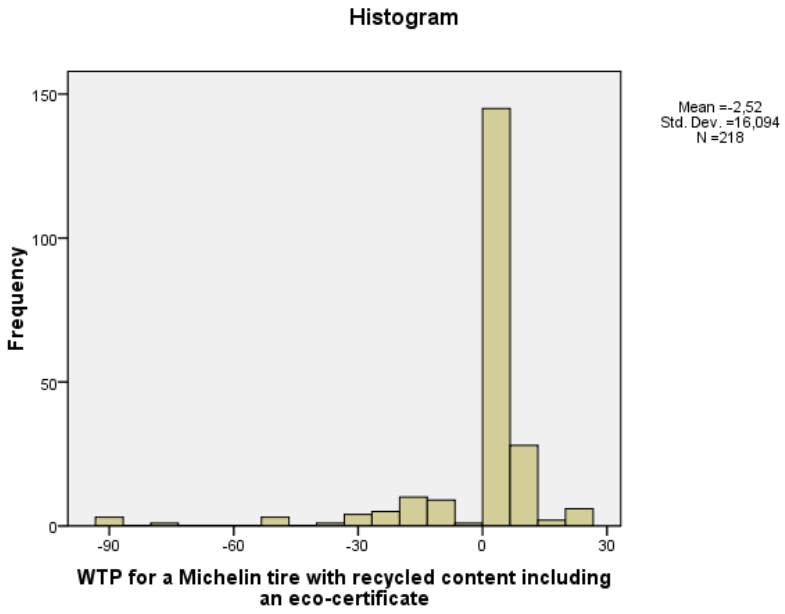


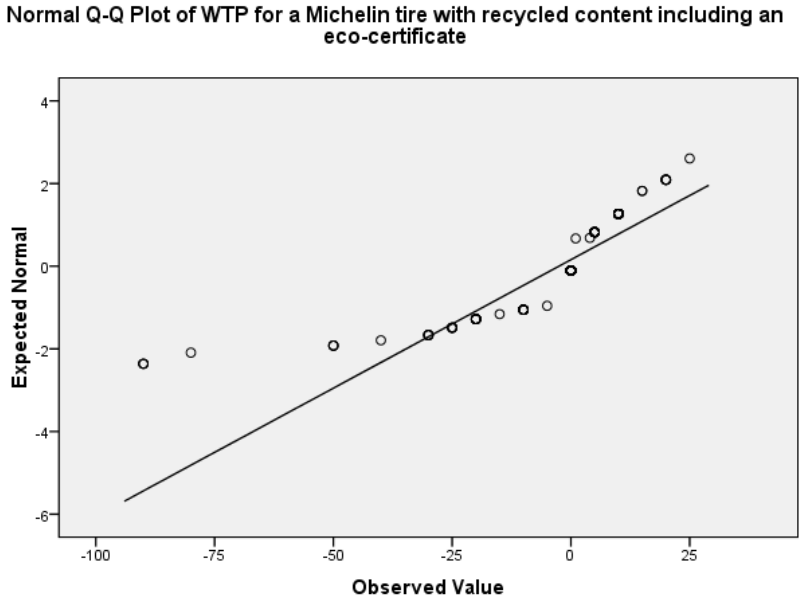
HP refurbished toner cartridge, including an eco-certificate





Michelin tire with recycled content and with an eco-certificate





Appendix E: Descriptive statistics

This appendix includes the descriptive statistics of the four tested hypothesis.

(Table C1: Descriptive statistics for the first hypothesis)

	Mean	**N**	**Std. deviation**
WTP for Xerox white paper including an eco-certificate	1,67	218	9,684
WTP for a Kodak refurbished camera including an eco-certificate	-0,65	218	13,457
WTP for a Nokia refurbished cell phone including an eco-certificate	-2,38	218	15,354
WTP for a Hp printer containing reused parts including an eco-certificate	-1,49	218	14,253
WTP for a Hp refurbished toner cartridge including an eco-certificate	-1,98	218	13,803
WTP for a Michelin tire with recycled content including an eco-certificate	-2,52	218	16,094
WTP for regular Xerox white paper	-0,34	229	6,700
WTP for a regular Kodak single use camera	-0,66	229	9,779
WTP for a regular Nokia cell phone	0,08	229	13,252
WTP for a regular Hp printer	0,94	229	7,262
WTP for a regular Hp toner cartridge	-0,14	228	6,134
WTP for a regular Michelin tire	1,54	228	9,791

The mean scores are the most crucial statistics in this table. It presents the mean scores from the respondents, about the question how much extra or less respondents are willing to pay for branded and recycled products with an eco-certificate vs. branded and recycled products without an eco-certificate over their standard prices (in percentages).

(Table C2: Continued descriptive statistics for the first hypothesis)

	Minimum	**Maximum**	**Percentiles: 25th**	**50th (median)**	**75th**
WTP for Xerox white paper including an eco-certificate	-75	50	0,00	0,00	5,00
WTP for a Kodak refurbished camera including an eco-certificate	-90	30	0,00	0,00	0,00
WTP for a Nokia refurbished cell phone including an eco-certificate	-90	30	0,00	0,00	1,75
WTP for a Hp printer containing reused parts including an eco-certificate	-90	30	0,00	0,00	0,25
WTP for a Hp refurbished toner cartridge including an eco-certificate	-90	40	0,00	0,00	0,00
WTP for a Michelin tire with recycled content including an eco-certificate	-90	25	0,00	0,00	1,75
WTP for regular Xerox white paper	-50	20	0,00	0,00	0,00
WTP for a regular Kodak single use camera	-90	20	0,00	0,00	0,00
WTP for a regular Nokia cell phone	-80	100	0,00	0,00	0,00
WTP for a regular Hp printer	-50	30	0,00	0,00	0,00
WTP for a regular Hp toner cartridge	-50	15	0,00	0,00	0,00
WTP for a regular Michelin tire	-50	110	0,00	0,00	0,00

(Table D1: Descriptive statistics for the second hypothesis)

	Mean	**N**	**Std. deviation**
WTP for Xerox white paper including an eco-certificate	1,67	218	9,684
WTP for a Kodak refurbished camera including an eco-certificate	-0,65	218	13,457
WTP for a Nokia refurbished cell phone including an eco-certificate	-2,38	218	15,354
WTP for a Hp printer containing reused parts including an eco-certificate	-1,49	218	14,253
WTP for a Hp refurbished toner cartridge including an eco-certificate	-1,98	218	13,803
WTP for a Michelin tire with recycled content including an eco-certificate	-2,52	218	16,094
WTP for Xerox white paper with recycled content	0,679	229	10,1719
WTP for a Kodak refurbished single use camera	-4,107	229	15,2782
WTP for a Nokia refurbished cell phone	-6,16	229	18,775
WTP for a Hp printer containing reused parts	-4,31	229	16,296
WTP for a refurbished Hp toner cartridge	-7,00	228	17,657
WTP for a Michelin tire with recycled content	-5,70	227	17,440

The mean scores are the most crucial statistics in this table. It presents the mean scores from the respondents, about the question how much extra or less respondents are willing to pay for branded and recycled products with an eco-certificate vs. branded and recycled products without an eco-certificate over their standard prices (in percentages).

(Table D2: Continued descriptive statistics for the second hypothesis)

	Minimum	**Maximum**	**Percentiles: 25th**	**50th (median)**	**75th**
WTP for Xerox white paper including an eco-certificate	-75	50	0,00	0,00	5,00
WTP for a Kodak refurbished camera including an eco-certificate	-90	30	0,00	0,00	0,00
WTP for a Nokia refurbished cell phone including an eco-certificate	-90	30	0,00	0,00	1,75
WTP for a Hp printer containing reused parts including an eco-certificate	-90	30	0,00	0,00	0,25
WTP for a Hp refurbished toner cartridge including an eco-certificate	-90	40	0,00	0,00	0,00
WTP for a Michelin tire with recycled content including an eco-certificate	-90	25	0,00	0,00	1,75
WTP for Xerox white paper with recycled content	-60,0	50,0	0,00	0,00	1,50
WTP for a Kodak refurbished single use camera	-80,0	50,0	-5,00	0,00	0,00
WTP for a Nokia refurbished cell phone	-75	120	-10,00	0,00	0,00
WTP for a Hp printer containing reused parts	-90	50	-10,00	0,00	0,00
WTP for a refurbished Hp toner cartridge	-90	50	-10,00	0,00	0,00
WTP for a Michelin tire with recycled content	-90	50	-10,00	0,00	0,00

(Table E1: Descriptive statistics for the third and fourth hypothesis)

	Mean	**N**	**Std. deviation**
WTP for Xerox white paper including an eco-certificate	1,67	218	9,684
WTP for a Kodak refurbished camera including an eco-certificate	-0,65	218	13,457
WTP for a Nokia refurbished cell phone including an eco-certificate	-2,38	218	15,354
WTP for a Hp printer containing reused parts including an eco-certificate	-1,49	218	14,253
WTP for a Hp refurbished toner cartridge including an eco-certificate	-1,98	218	13,803
WTP for a Michelin tire with recycled content including an eco-certificate	-2,52	218	16,094

The mean scores are the most crucial statistics in this table. It presents the mean scores from the respondents, about the question how much extra or less respondents are willing to pay for branded and recycled products with an eco-certificate vs. branded and recycled products without an eco-certificate over their standard prices (in percentages).

(Table E2: Continued descriptive statistics for the third and fourth hypothesis)

	Minimum	**Maximum**	**Percentiles: 25th**	**50th (median)**	**75th**
WTP for Xerox white paper including an eco-certificate	-75	50	0,00	0,00	5,00
WTP for a Kodak refurbished camera including an eco-certificate	-90	30	0,00	0,00	0,00
WTP for a Nokia refurbished cell phone including an eco-certificate	-90	30	0,00	0,00	1,75
WTP for a Hp printer containing reused parts including an eco-certificate	-90	30	0,00	0,00	0,25
WTP for a Hp refurbished toner cartridge including an eco-certificate	-90	40	0,00	0,00	0,00
WTP for a Michelin tire with recycled content including an eco-certificate	-90	25	0,00	0,00	1,75

Appendix F: Rank scores for the sample split

(Table F1: Rank scores of the Wilcoxon signed rank test per branded product group: Group Business Administration)

		N	Mean Rank	Sum of ranks	Z	Asymp. Sig. (2-tailed)
WTP for regular Xerox white paper - WTP for Xerox white recycled paper including an eco-certificate	Negative ranks	29	20,53	595,50	-2,536a	0,011
	Positive ranks	11	20,41	224,50		
	Ties	62				
	Total	102				
WTP for a regular Kodak single use camera - WTP for a Kodak refurbished camera including an eco-certificate	Negative ranks	22	18,68	411,00	-0,297a	0,767
	Positive ranks	17	21,71	369,00		
	Ties	63				
	Total	102				
WTP for a regular Nokia cell phone - WTP for a Nokia refurbished cell phone including an eco-certificate	Negative ranks	25	20,08	502,00	-1,314b	0,189
	Positive ranks	25	30,92	773,00		
	Ties	52				
	Total	102				
WTP for a regular Hp printer - WTP for a Hp printer containing reused parts including an eco-certificate	Negative ranks	22	16,16	255,50	-1,840b	0,066
	Positive ranks	23	29,54	679,50		
	Ties	57				
	Total	102				

		N	Mean Rank	Sum of ranks	Z	Asymp. Sig. (2-tailed)
WTP for a regular Hp toner cartridge - WTP for a Hp refurbished toner cartridge including an eco-certificate	Negative ranks	23	18,91	435,00	-0,466b	0,641
	Positive ranks	20	25,55	511,00		
	Ties	59				
	Total	102				
WTP for a regular Michelin tire - WTP for a Michelin tire with recycled content including an eco-certificate	Negative ranks	18	12,64	227,50	-2,471b	0,013
	Positive ranks	22	26,93	592,50		
	Ties	62				
	Total	102				

c. Based on positive ranks
d. Based on negative ranks

(Table F2: Rank scores of the Wilcoxon signed rank test per branded product group: Group Engineering)

		N	Mean Rank	Sum of ranks	Z	Asymp. Sig. (2-tailed)
WTP for regular Xerox white paper - WTP for Xerox white recycled paper including an eco-certificate	Negative ranks	36	27,54	991,50	-2,483a	0,013
	Positive ranks	17	25,85	439,50		
	Ties	62				
	Total	115				
WTP for a regular Kodak single use camera - WTP for a Kodak refurbished camera including an eco-certificate	Negative ranks	32	22,11	707,50	-0,686a	0,492
	Positive ranks	18	31,53	567,50		
	Ties	65				
	Total	115				
WTP for a regular Nokia cell phone - WTP for a Nokia refurbished cell phone including an eco-certificate	Negative ranks	30	25,45	763,50	-1,317b	0,188
	Positive ranks	31	36,37	1127,50		
	Ties	54				
	Total	115				
WTP for a regular Hp printer - WTP for a Hp printer containing reused parts including an eco-certificate	Negative ranks	29	21,19	614,50	-0,905b	0,366
	Positive ranks	24	34,02	816,50		
	Ties	62				
	Total	115				

		N	Mean Rank	Sum of ranks	Z	Asymp. Sig. (2-tailed)
WTP for a regular Hp toner cartridge - WTP for a Hp refurbished toner cartridge including an eco-certificate	Negative ranks	25	18,68	467,00	-1,463b	0,143
	Positive ranks	24	31,58	758,00		
	Ties	65				
	Total	114				
WTP for a regular Michelin tire - WTP for a Michelin tire with recycled content including an eco-certificate	Negative ranks	28	19,66	550,50	-1,857b	0,063
	Positive ranks	27	36,65	989,50		
	Ties	59				
	Total	114				

a. Based on positive ranks
b. Based on negative ranks

(Table F3: Rank scores of the Wilcoxon signed rank test per branded product group: Group Business Administration)

		N	Mean Rank	Sum of ranks	Z	Asymp. Sig. (2-tailed)
WTP for Xerox white paper with recycled content - WTP for Xerox white recycled paper including an eco-certificate	Negative ranks	18	15,19	273,50	-1,223a	0,221
	Positive ranks	11	14,68	161,50		
	Ties	73				
	Total	102				
WTP for a Kodak refurbished single use camera - WTP for a Kodak refurbished camera including an eco-certificate	Negative ranks	22	18,75	412,50	-1,978a	0,048
	Positive ranks	12	15,21	182,50		
	Ties	68				
	Total	102				
WTP for a Nokia refurbished cell phone - WTP for a Nokia refurbished cell phone including an eco-certificate	Negative ranks	28	23,09	646,50	-1,779a	0,075
	Positive ranks	16	21,47	343,50		
	Ties	58				
	Total	102				
WTP for a Hp printer containing reused parts - WTP for a Hp printer containing reused parts including an eco-certificate	Negative ranks	23	20,28	466,50	-1,751a	0,080
	Positive ranks	14	16,89	236,50		
	Ties	65				
	Total	102				

		N	Mean Rank	Sum of ranks	Z	Asymp. Sig. (2-tailed)
WTP for a refurbished Hp toner cartridge - WTP for a Hp refurbished toner cartridge including an eco-certificate	Negative ranks	34	25,74	875,00	-4,089a	0,000
	Positive ranks	11	14,55	160,00		
	Ties	57				
	Total	102				
WTP for a Michelin tire with recycled content - WTP for a Michelin tire with recycled content including an eco-certificate	Negative ranks	24	24,33	584,00	-2,002a	0,045
	Positive ranks	17	16,29	277,00		
	Ties	60				
	Total	101				

a. Based on positive ranks
b. Based on negative ranks

(Table F4: Rank scores of the Wilcoxon signed rank test per branded product group: Group Engineering)

		N	Mean Rank	Sum of ranks	Z	Asymp. Sig. (2-tailed)
WTP for Xerox white paper with recycled content - WTP for Xerox white recycled paper including an eco-certificate	Negative ranks	30	23,68	710,50	-2,203a	0,028
	Positive ranks	15	21,63	324,50		
	Ties	70				
	Total	115				
WTP for a Kodak refurbished single use camera - WTP for a Kodak refurbished camera including an eco-certificate	Negative ranks	44	29,00	1276,00	-4,635a	0,000
	Positive ranks	10	20,90	209,00		
	Ties	61				
	Total	115				
WTP for a Nokia refurbished cell phone - WTP for a Nokia refurbished cell phone including an eco-certificate	Negative ranks	47	29,06	1366,00	-4,312a	0,000
	Positive ranks	10	28,70	287,00		
	Ties	58				
	Total	115				
WTP for a Hp printer containing reused parts - WTP for a Hp printer containing reused parts including an eco-certificate	Negative ranks	37	23,41	866,00	-3,219a	0,001
	Positive ranks	10	26,20	262,00		
	Ties	68				
	Total	115				

		N	Mean Rank	Sum of ranks	Z	Asymp. Sig. (2-tailed)
WTP for a refurbished Hp toner cartridge - WTP for a Hp refurbished toner cartridge including an eco-certificate	Negative ranks	43	24,72	1063,00	-4,136a	0,000
	Positive ranks	7	30,29	212,00		
	Ties	64				
	Total	114				
WTP for a Michelin tire with recycled content - WTP for a Michelin tire with recycled content including an eco-certificate	Negative ranks	37	27,24	1008,00	-2,932a	0,003
	Positive ranks	15	24,67	370,00		
	Ties	62				
	Total	114				

a. Based on positive ranks
b. Based on negative ranks

(Table F5: Rank scores of the Wilcoxon signed rank test per certificated branded product group: Group Business Administration)

			N	Mean Rank	Sum of ranks	Z	Asymp. Sig. (2-tailed)
Pair 1	WTP for a Kodak refurbished camera including an eco-certificate - WTP for Xerox white paper including an eco-certificate	Negative ranks	12	13,70	158,00	-1,040a	0,299
		Positive ranks	10	9,50	95,00		
		Ties	80				
		Total	102				
Pair 2	WTP for a Nokia refurbished cell phone including an eco-certificate - WTP for Xerox white paper including an eco-certificate	Negative ranks	25	21,20	530,00	-2,705a	0,007
		Positive ranks	12	14,42	173,00		
		Ties	65				
		Total	102				
Pair 3	WTP for a Hp printer containing reused parts including an eco-certificate - WTP for Xerox white paper including an eco-certificate	Negative ranks	20	16,88	337,50	-2,618a	0,009
		Positive ranks	9	10,83	97,50		
		Ties	73				
		Total	102				

			N	Mean Rank	Sum of ranks	Z	Asymp. Sig. (2-tailed)
Pair 4	WTP for a Hp refurbished toner cartridge including an eco-certificate - WTP for Xerox white paper including an eco-certificate	Negative ranks	16	13,47	215,50	-2,383a	0,017
		Positive ranks	7	8,64	60,50		
		Ties	79				
		Total	102				
Pair 5	WTP for a Michelin tire with recycled content including an eco-certificate - WTP for Xerox white paper including an eco-certificate	Negative ranks	25	17,86	446,50	-3,431a	0,001
		Positive ranks	7	11,64	81,50		
		Ties	70				
		Total	102				
Pair 6	WTP for a Nokia refurbished cell phone including an eco-certificate - WTP for a Kodak refurbished camera including an eco-certificate	Negative ranks	24	16,67	400,00	-2,558a	0,011
		Positive ranks	8	16,00	128,00		
		Ties	70				
		Total	102				

			N	Mean Rank	Sum of ranks	Z	Asymp. Sig. (2-tailed)
Pair 7	WTP for a Hp printer containing reused parts including an eco-certificate - WTP for a Kodak refurbished camera including an eco-certificate	Negative ranks	17	14,82	252,00	-1,962a	0,050
		Positive ranks	9	11,00	99,00		
		Ties	76				
		Total	102				
Pair 8	WTP for a Hp refurbished toner cartridge including an eco-certificate - WTP for a Kodak refurbished camera including an eco-certificate	Negative ranks	14	13,57	190	-1,598a	0,110
		Positive ranks	9	9,56	86,00		
		Ties	79				
		Total	102				
Pair 9	WTP for a Michelin tire with recycled content including an eco-certificate - WTP for a Kodak refurbished camera including an eco-certificate	Negative ranks	25	18,16	454,00	-2,691a	0,007
		Positive ranks	9	15,67	141,00		
		Ties	68				
		Total	102				

			N	Mean Rank	Sum of ranks	Z	Asymp. Sig. (2-tailed)
Pair 10	WTP for a Hp printer containing reused parts including an eco-certificate - WTP for a Nokia refurbished cell phone including an eco-certificate	Negative ranks	12	13,12	157,50	-1,045b	0,296
		Positive ranks	16	15,53	248,50		
		Ties	74				
		Total	102				
Pair 11	WTP for a Hp refurbished toner cartridge including an eco-certificate - WTP for a Nokia refurbished cell phone including an eco-certificate	Negative ranks	16	16,28	260,50	-0,899b	0,369
		Positive ranks	19	19,45	369,50		
		Ties	67				
		Total	102				
Pair 12	WTP for a Michelin tire with recycled content including an eco-certificate - WTP for a Nokia refurbished cell phone including an eco-certificate	Negative ranks	15	11,93	179,00	0,089a	0,929
		Positive ranks	11	15,64	172,00		
		Ties	76				
		Total	102				

			N	Mean Rank	Sum of ranks	Z	Asymp. Sig. (2-tailed)
Pair 13	WTP for a Hp refurbished toner cartridge including an eco-certificate - WTP for a Hp printer containing reused parts including an eco-certificate	Negative ranks	11	9,77	107,50	-0,281b	0,779
		Positive ranks	10	12,35	123,50		
		Ties	81				
		Total	102				
Pair 14	WTP for a Michelin tire with recycled content including an eco-certificate - WTP for a Hp printer containing reused parts including an eco-certificate	Negative ranks	23	17,54	403,50	-1,828a	0,068
		Positive ranks	11	17,41	191,50		
		Ties	68				
		Total	102				
Pair 15	WTP for a Michelin tire with recycled content including an eco-certificate - WTP for a Hp refurbished toner cartridge including an eco-certificate	Negative ranks	22	19,61	431,50	-1,556a	0,120
		Positive ranks	14	16,75	234,50		
		Ties	66				
		Total	102				

c. Based on positive ranks.
d. Based on negative ranks.

(Table F6: Rank scores of the Wilcoxon signed rank test per certificated branded product group: Group Engineering)

			N	Mean Rank	Sum of ranks	Z	Asymp. Sig. (2-tailed)
Pair 1	WTP for a Kodak refurbished camera including an eco-certificate - WTP for Xerox white paper including an eco-certificate	Negative ranks	27	16,67	450,00	-3,994a	0,000
		Positive ranks	4	11,50	46,00		
		Ties	85				
		Total	116				
Pair 2	WTP for a Nokia refurbished cell phone including an eco-certificate - WTP for Xerox white paper including an eco-certificate	Negative ranks	35	25,13	879,50	-4,118a	0,000
		Positive ranks	10	15,55	155,50		
		Ties	71				
		Total	116				
Pair 3	WTP for a Hp printer containing reused parts including an eco-certificate - WTP for Xerox white paper including an eco-certificate	Negative ranks	32	22,34	715,00	-3,726a	0,000
		Positive ranks	9	16,22	146,00		
		Ties	75				
		Total	116				

			N	Mean Rank	Sum of ranks	Z	Asymp. Sig. (2-tailed)
Pair 4	WTP for a Hp refurbished toner cartridge including an eco-certificate - WTP for Xerox white paper including an eco-certificate	Negative ranks	36	22,28	802,00	-4,840a	0,000
		Positive ranks	5	11,80	59,00		
		Ties	75				
		Total	116				
Pair 5	WTP for a Michelin tire with recycled content including an eco-certificate - WTP for Xerox white paper including an eco-certificate	Negative ranks	32	23,05	737,50	-4,007a	0,000
		Positive ranks	9	13,72	123,50		
		Ties	75				
		Total	116				
Pair 6	WTP for a Nokia refurbished cell phone including an eco-certificate - WTP for a Kodak refurbished camera including an eco-certificate	Negative ranks	26	19,19	499,00	-1,888a	0,059
		Positive ranks	12	20,17	242,00		
		Ties	78				
		Total	116				

			N	Mean Rank	Sum of ranks	Z	Asymp. Sig. (2-tailed)
Pair 7	WTP for a Hp printer containing reused parts including an eco-certificate - WTP for a Kodak refurbished camera including an eco-certificate	Negative ranks	18	13,17	237,00	-0,433a	0,665
		Positive ranks	11	18,00	198,00		
		Ties	87				
		Total	116				
Pair 8	WTP for a Hp refurbished toner cartridge including an eco-certificate - WTP for a Kodak refurbished camera including an eco-certificate	Negative ranks	28	20,45	572,50	-2,210a	0,027
		Positive ranks	12	20,62	247,50		
		Ties	76				
		Total	116				
Pair 9	WTP for a Michelin tire with recycled content including an eco-certificate - WTP for a Kodak refurbished camera including an eco-certificate	Negative ranks	23	20,80	478,50	-1,246a	0,213
		Positive ranks	16	18,84	301,50		
		Ties	77				
		Total	116				

			N	Mean Rank	Sum of ranks	Z	Asymp. Sig. (2-tailed)
Pair 10	WTP for a Hp printer containing reused parts including an eco-certificate - WTP for a Nokia refurbished cell phone including an eco-certificate	Negative ranks	12	13,12	157,50	-1,315b	0,189
		Positive ranks	17	16,32	277,50		
		Ties	87				
		Total	116				
Pair 11	WTP for a Hp refurbished toner cartridge including an eco-certificate - WTP for a Nokia refurbished cell phone including an eco-certificate	Negative ranks	20	17,18	343,50	-0,471a	0,638
		Positive ranks	15	19,10	286,50		
		Ties	81				
		Total	116				
Pair 12	WTP for a Michelin tire with recycled content including an eco-certificate - WTP for a Nokia refurbished cell phone including an eco-certificate	Negative ranks	22	20,25	445,50	-0,337b	0,736
		Positive ranks	21	23,83	500,50		
		Ties	73				
		Total	116				

			N	Mean Rank	Sum of ranks	Z	Asymp. Sig. (2-tailed)
Pair 13	WTP for a Hp refurbished toner cartridge including an eco-certificate - WTP for a Hp printer containing reused parts including an eco-certificate	Negative ranks	21	16,14	339,00	-1,803a	0,071
		Positive ranks	10	15,70	157,00		
		Ties	65				
		Total	116				
Pair 14	WTP for a Michelin tire with recycled content including an eco-certificate - WTP for a Hp printer containing reused parts including an eco-certificate	Negative ranks	20	22,65	453,00	-0,893a	0,372
		Positive ranks	19	17,21	327,00		
		Ties	77				
		Total	116				
Pair 15	WTP for a Michelin tire with recycled content including an eco-certificate - WTP for a Hp refurbished toner cartridge including an eco-certificate	Negative ranks	17	19,71	335,00	-0,774b	0,439
		Positive ranks	22	20,23	445,00		
		Ties	77				
		Total	116				

a. Based on positive ranks.
b. Based on negative ranks.

(Table F7: Absolute mean values for the six product groups: Group Business Administration)

	White paper	Single use camera	Cell phone	Printer	Toner cartridge	Car tire
Standard price	€ 10,-	€ 10,-	€ 100,-	€ 100,-	€ 50,-	€ 100,-
Only the branded product	-0,93	0,28	0,42	1,62	0,00	1,94
With recycled component	0,32	-1,78	-4,40	-3,12	-5,32	-4,61
With eco-certification	1,15	0,59	-2,31	-0,79	-0,69	-2,31

(Table F8: Absolute mean values for the six product groups: Group Engineering)

	White paper	Single use camera	Cell phone	Printer	Toner cartridge	Car tire
Standard price	€ 10,-	€ 10,-	€ 100,-	€ 100,-	€ 50,-	€ 100,-
Only the branded product	0,17	-1,49	-0,22	0,33	-0,27	1,17
With recycled component	1,00	-6,18	-7,73	-5,36	-8,50	-6,68
With eco-certification	2,12	-1,74	-2,44	-2,10	-3,11	-2,71