Master's Research Project Report

Information effect on customer preference for recycled-plastic packaging: A case of a recycled-plastic water bottle in Mongolia

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Abstract

50 years ago, plastic was very useful and advanced material in the world. Unfortunately, it is now one of the biggest polluters of the environment. Wild animals are entangled in plastic and thus feel extreme pain. The animals even eat it and die due to digestion. Furthermore, micro and nano plastics are found in our food and drinking water. It even emits carbon dioxide (CO2). Every nation is attempting to solve problems with plastic. Particularly, for developing countries, it is a serious issue. Mongolia is developing country. Only 8.3% of plastic waste is recycled in there. Most of recycled plastics in Mongolia were exported to China. Since 2017, the country banned importation of nearly all types of plastic waste. Due to it, a recycled-plastic market for Mongolian companies shrank considerably. Therefore, to support the companies and to increase an amount of recycled plastic, it is essential to solve the market issue. Penetrating a consumer market is a solution to it.

A primary purpose of this research is to explore customer preference and attitude to a recycled plastic bottle and to discover information effect on the attitude. In Mongolia, there is a large amount of information regarding dangers of plastic products. Therefore, Mongolians strongly express their negative attitude to the product. On the other hand, information relating with recycled plastic products is insufficient. In this case, how customers perceive a recycled plastic product and their reaction after receiving such information is unknown. The research aims to investigate this issue. 1049 Mongolian people participated in this research. A survey was conducted in September 2019.

First, the research investigated customer preferences for new and recycled plastic bottles. Even though nearly half of respondents did not consider the bottle difference, a new plastic bottle was preferred twice as many as a recycled one. Customer age, usage experience and the perceptions of impurity and health impact had a significant correlation with the customer preference. To measure a customer attitude, a 12-point scale was employed. Respondents who preferred one of the bottles tended to be certain of their choice. After the first scale, respondents received information related with recycled plastic material and afterwards evaluated their attitude on the same point scale once more. Information effects were determined by a variation of the first and second attitude points. The information influenced on over one third of all respondents. Positive information tended to affect more than negative one. The most influential positive information is regarding product value of a recycled plastic bottle. The negative one is news which aimed at product outcome.

Contents

List of Figures

List of Tables

Chapter 1
Introduction

Chapter 1 provides a brief introduction of this research. Plastic pollution statistics and solutions for the waste are included in the chapter. Mongolian situation, especially an information environment is described. Research problem, aim and objectives are introduced and follow by the research motivation and significance. There is a structure of this report as well.

1.1 Background

Waste pollution - Mankind has been inventing numerous new things in a short time. Unfortunately, bulk of the inventions is out of environmental cycles and therefore produces a large amount of waste. Waste damages the environment and the ecosystem permanently. Other living beings have been still living without nature destruction for hundred million years. In 2016, 2.01 billion tons of waste were generated in the world and each person discarded 0.74kg waste every day. 34 years later, the amount of waste will rise by 70% up to 3.4 billion tons [46]. It will increase environmental pollution by the same amount. Therefore, it is essential to protect the natural ecosystem by reducing an amount of waste. Although waste is an issue of both of developed and developing countries, 90% of developing countries discards waste in unregulated sites and incinerates openly [46]. Therefore, waste management improvement of developing countries is one of the most important policies to protect the environment.

Plastic waste - In 1907, plastic was invented and named “Bakelite” [25]. Due to characteristics such as being shaped easily, low cost, resistance for electricity conduction, et cetera, plastic started being sold and plastic bags were manufactured in 1950 and 1970 respectively [42]. As growth of plastic consumption, the negative side of plastic material appeared gradually. At present, a huge amount of plastic waste is being generated everywhere. It has potential to exist in the environment for 500 years or more [2]. It pollutes air by emission, entangles wild animals and causes a digestion problem to the animals to be harmed and dead due to it [41]. Micro and nano plastics are found everywhere in the soil, the ocean, food, drinking water, et cetera [22]. Researchers are still investigating its effect on human health and the environment. Furthermore, plastic waste influences on climate change and 83% of pure water polluted by plastic debris

according to the research in 2017.

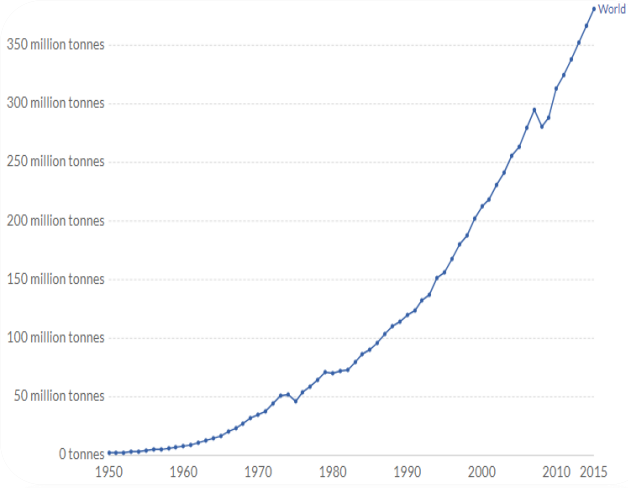


Figure 1-1.Global plastic production [20].

Plastic consumption is increasing rapidly (figure 1-1). The horizontal axis of the chart shows dates to an amount of plastic production in a decade. The vertical axis displays an amount of plastic production. 407 million tons of plastic were used for manufacturing plastic products in 2015. 42% of the plastic uses to produce single-use packaging. From 1950 to 2015, 8.3 billion tons of waste had been generated. Plastic covers 10% of total waste in the world. 55% of it was discarded at dumpsites. 8% and 6% of the waste were incinerated and recycled, respectively.

Solutions to plastic waste - There are several methods to solve plastic waste such as landfill, incineration, energy recovery, downgauging, reuse, recycling, biodegradation, and circular business [24]. Landfill has been still a major solution so far. 79% of the plastic waste generated between 1950 and 2015 were transferred to landfill sites or environment, 12% and 9% were recycled and incinerated, respectively [22]. However, the methods have some disadvantages. Landfill is not a suitable method considering that waste in disposal areas is still dangerous for near environment and human health. Incineration produces hazardous substances into the atmosphere [24]. However, recycling has not the disadvantages of landfill and incineration and is one of the biggest solutions. If all plastic over the world is recycled, it would save 3.5-billion-barrel oil. It equals 176 billion dollars [23].

Plastic recycling in Mongolia - In 2015, 2.9 million tons of waste were generated in Mongolia. The waste had risen roughly threefold within 5 years since 2010 [49]. 880.2-1237.2 tons of waste are generated in Ulaanbaatar per day. An amount of plastic in the daily waste is nearly 2 tons. Only 3.2% of it becomes raw material for Mongolian recyclers. There is no waste sorting and incineration system. Roughly 90% of it goes to landfill areas [17]. In 2018, plastic waste constituted 14% of recyclable waste in Mongolia [48]. As an amount, 150 thousand tons of plastic waste are recyclable plastic. However, only 8.3% of it, 25 thousand tons of plastic is recycled per year (PET – 20,000 HDPE –

3000, LDPE – 1000, PP 500 tons). For last 4 years, Mongolian plastic importation has doubled and reached 19,254 tons in 2014. On the other hand, the government of China banned the importation of plastic waste in 2017 [49]. Beverage manufacturers are major users of plastic material in Mongolia. 553,164,637 pieces of packing boxes, plastic bottles and lids were imported in 2014.

There are over 15 plastic recycling companies in Ulaanbaatar. 10 of the companies are mid-sized and 5 produce plastic pellets and export it to China. The company, “An Se He” LLC which buys most of recycled plastic produces plastic tubes and construction tools. Although there is a company which has potential to produce 50 different types of plastic products for a business market, it is a small-sized company and does not work sustainably [49]. It shows that some of the pellets are used in domestic, however, plastic tubes and construction tools are for a business market. Most of recycled plastic in Mongolia becomes plastic pellets and is exported to China [48]. Considering the above facts, plastic products from other countries conquer Mongolian consumer market.

Information related with recycled plastic in Mongolia - The official language of Mongolia is Mongolian. All information and news from Mongolian television channels, newspapers and news agencies are in Mongolian language, first. At present, nearly all information and news are uploaded on the internet. There was general information regarding recycling plants, recyclers, and some statistics. However, information included the contents, “Recycled plastic has impurity” and “Recycled plastic is worse than new one” is there as well. Hence, it is possible to conclude that there is insufficient information regarding advantage and disadvantage of recycled-plastic product. On the other hand, there was a large amount of information regarding plastic dangers. Here is one example of the information regarding plastic products through Mongolian national broadcasting on the Facebook.

Figure 1-2:News via Mongolian national broadcasting [21].

Title: “Herders, please do not use plastic utensils”

Content:

• Experts indicate that usage of plastic container is the reason to spread cancer among rural citizens.

• The herder woman had a cancer. Doctors said the cancer caused by usage of plastic containers and utensils.

• Fortunately, she was operated and

removed the cancer in 2013. After that, she decided to replace plastic with another materials for use.

• Furthermore, she is appealing to public not to use plastic container and utensils.

The above news was uploaded in February 2019. Within 9 months, the news had been viewed 270,000, shared 4300 and 55 people sent their reaction. The recycled products are made by plastic material. Hence, such information directed at recycled-plastic products may influence to a customer attitude to the products.

1.2 Problem definition

There is necessity that Mongolian plastic recyclers penetrate new markets, especially a consumer market. A reason is that the biggest buyers of Mongolian recyclers were Chinese companies. The government of China forbade importation of plastic waste in 2017. Consequently, Mongolian recyclers lost their largest market, whereas an amount of plastic import was increasing. If the plastic recyclers penetrate a bottle market of beverage and juice, it can solve several problems by one solution.

There will be unknown situation when penetrating a consumer market. Most recyclers produce plastic granules and export them to China. The other plastic is used to produce plastic tubes, construction equipment and other similar things. These are business products. Although there is a company which produces 50 different products such as a chair, a table and fence, it is a small company and does not work sustainably. Hence, it is possible to conclude that Mongolia plastic recyclers do not produce consumer products. Therefore, there will be unknown situation due to a customer perception.

There is possibility that information influences on a customer attitude. The Mongolian people have not enough information regarding the recycled products. There is little information. If the people receive more information, how will their attitude be changed? Lots of people agree dangers of plastic material. The material is a nature of recycled plastic products as well. If such information directs at recycled plastic products, will there be the same reaction from customers?

Hence, a research purpose is to know a customer perception of the recycled plastic products and its change depending on relevant information.

1.3 Research aim and objectives

This study focuses on information effects on a customer attitude. In response to this, this study aims to investigate a customer preference and attitude to a recycled-plastic water bottle, factors, and information effects on the attitude.

Objectives

1. To find out a customer preference and attitude to a recycled plastic bottle

2. To discover information effects on a customer attitude.

3. To explore an opportunity to penetrate a consumer market for Mongolian plastic recyclers.

1.4 Motivation and significance

The Mongolian plastic import has been increasing whereas the plastic export was decreased. It caused rapid growth of plastic waste and thus plastic pollution in Mongolia. There are few plastic recyclers. Therefore, it is essential to motivate plastic recycling in Mongolia. Due to the Chinese prohibition, their market has shrunk considerably. However, there is an opportunity of broadening the market. It is penetration of consumer markets. Mongolian plastic recyclers have nearly no experience on end-consumer market. Under this circumstance, there will be high risk to penetrate the consumer market due to unknown perception. This research will help to understand customers' perception.

It will be one part of influential factors in a purchase decision. Modern companies aspire to have complete database of customers for a reason of exact prediction of customer reactions in any circumstance. In other words, they aim to find all factors which correlation coefficient reaches 1.0 with the changes. The research aimed to investigate information effects on customers' perception of probability, risk/value and a tendency and thus calculate correlation between the decision changes and the information types. This calculation will be dedicated to an exact prediction of purchase-decision changes.

1.5 Thesis structure

Chapter 1 provides a brief introduction of this research. Plastic pollution statistics and solutions for the waste are included in the chapter. Mongolian situation, especially an information environment is described. Research problem, aim and objectives are introduced and follow by the research motivation and significance. There is a structure of this report as well.

Chapter 2 shows theoretical background, research methods and prior findings relating with decision-making. The second part consists of literature review regarding information effects. At last, there is a summary for determining research scope and choosing research methods.

Chapter 3 introduces research questions and data necessity. A questionnaire structure covers questions and answers for obtaining necessary data and a relation between them. It includes news which is designed for this research and appearance. At last, information regarding sampling method, the number of participants and distributed questionnaire is included.

Chapter 4 starts with a description of gathered questionnaires and its composition. In this chapter, Mongolian customers of bottled water are determined. Their preference and comparison are introduced. Customer attitudes are measured as well. There are calculation and comparison of information effect. It includes analysis of customers' perception of plastic bottles recycled by Mongolian companies.

Chapter 5 compares the recent results with previous ones. First, it shows findings related with customer preference and attitude. It includes findings regarding factors of the customer preference. At last, there is a part of information types and effects.

Chapter 6 covers a research conclusion. The conclusion consists of consumer market of bottled water in Mongolia, a customer preference for recycled plastic bottle, information effect on customer attitude and opportunities to penetrate consumer market. The chapter covers research implication and limitation as well.

Chapter 2

Literature review

Chapter 2 shows theoretical background, research methods and prior findings relating with decision-making. The second part consists of literature review regarding information effects. At last, there is a summary for determining research scope and choosing research methods.

2.1 Customer preference and attitude

2.1.1. Conceptual framework

Customer:

- A person who buys goods or a service [5].
- A person who purchases goods or services from another; buyer; patron [11].
- A person or company that buys goods or services [35].

Hence, possible participants of the research are people who buy bottled water.

Preference:

- The fact of liking or wanting one thing more than another [7].
- That which is preferred; choice [14].
- A feeling of liking or wanting someone or something more than someone or something else [38].

Hence, how people choose or prefer a product will be investigated.

Customer preference is an act of preferring one alternative to others. It is a natural process of decision-making [51]. There are several basic processes (perception, memory, attention, etc) which are activated by the act of a selection [18]. There must be a choice in order to select the alternative [32]. An essential condition of a choice is a set of options [51]. Each alternative has several basic characteristics depending on perceptions of product value or risk [32].

Outcomes, values, differential importance and occur probabilistically are primary pillars of any selection (figure 2-1). To influence customer preference, targeting the pillars is essential. A product is not evaluated by only its fundamental functions. There are relevant external factors such as words and objects related with the products [50].

Multialternatives	Each associated with one or more outcomes	That have fixed values to the decision-maker	Which may have differential importance	And/or occur probabilistically
A_1	O_1	+	W_1	P_{11}
	O_2	-	W_2	P_{12}
	O_3	+	W_3	P_{13}
A_2	O_1	+	W_1	P_{21}
	O_2	-	W_2	P_{22}
	O_3	+	W_3	P_{23}
A_3	O_1	+	W_1	P_{31}
	O_2	-	W_2	P_{32}
	O_3	+	W_3	P_{33}

Figure 2-1. A general structural framework for analyzing decision-making [32].

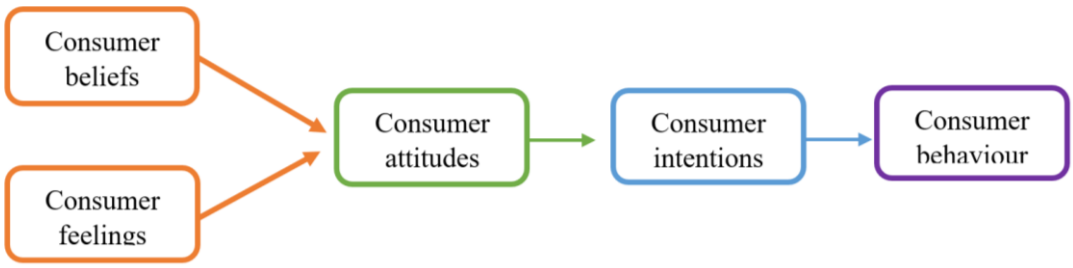


Figure 2-2. Relationship between consumer beliefs, feelings, attitudes, intentions and behavior [44]

Consumer attitude – it is a result of product judgment. If customers like the product, it is a positive attitude. If opposite, it is negative.
Consumer intention – it is how customers treat a product in the future.
Consumer beliefs – it is subjective thoughts regarding the product.
Consumer feelings – it is feeling regarding the product while consumers are using the product or thinking relevant things with the product [44].

2.1.2. Research method review

To research a relation between online WOM (word of mouth) and introduction of new product (beverage), Daniela Baum and her colleagues needed to investigate consumer attitudes to the beverage [9]. The researchers measured a taste of the beverage and attitudes to the bottle by using a 5-point scale. Other product attributes were measured by the same method. Another example of the method is measurement of a consumer perception of computer speed (from “Definitely NOT Fast” to “Definitely Fast”). As measuring the attribute, the researcher aimed to explore an irrelevant-information effect on it [47]. Likewise, a 7-point scale was employed to discover product attributes such as good quality, attraction, freshness, and health impact [1].

A consumer attitude to environmental issues can be measured by a Likert point scale as well. An attitude to recycled water was evaluated by a 7-point scale. Its answer interval was from disagree to agree and from unfavorable to favorable [29]. Likewise, an attitude to environmental packaging and recycling were estimated by a 5-point scale [27]. Furthermore, the research questions related with purchase intention and consumer attitude were designed with an answer style of a Likert point scales (from disagree to agree) as well [26].

From a perspective of studying an ecological product, Keiko Yamaguchi and Kenji Takeuchi researched a consumer perception of a refill pack in a way to design questions for studying attributes of the pack and to gather participants’ answer by a 4-point scale (from “strongly agree” to “strongly disagree”) [28]. Willing to pay (hereafter, WTP) is one of the methods to measure the attitude as well. It was employed to investigate French consumers' perception of plastic water bottles [8].

2.1.3. Previous relevant findings

Caroline Orset and her colleagues explored that customers tended to pay for packaging made from recycled plastic and biodegradable bio plastic (PLA) more than new one [8]. Information effects depending on information types was investigated in a case of wild and farmed codes (fish). As a result, it was difficult to change some beliefs by the information. Some negative beliefs were strong to decrease price until 0. Consumers are sensitive to freshness of packaging [1]. In contrast, environmental awareness can change a purchase decision in a way to promote customers’ emotion. The emotion significantly influences on a choice [39]. A customer perception of product packaging can influence on attitudes to other properties of a product. Another finding is that a customer attitude

cannot represent a purchase decision precisely [40]. Eco-friendly packaging has a potential to increase a product value [10]. Some people choose eco-packaging due to its economic benefit, whereas the others prefer the packaging for more valuable life [34]. Being eco-friendly is an important factor to influence on a perception of packaging material as well [33].

Women are more sensitive to product risk, especially for chemical products. Youngsters do not consider the risk in general [45]. Men barely reuse plastic packaging whereas elders tend to recycle and use it [34]. When customers buy a fish in packaging, the customers compare product origin, intrinsic quality, convenience, and nutrition [1]. Graca Martinho and his colleagues clustered customers as gender, eco-friendly opinion, social awareness, and an attitude to green purchase [19].

2.2 Information effect and difference

2.1.1. Conceptual framework

Information:

- facts or details about a person, company, product, etc [6].
- knowledge communicated or received concerning a particular fact or circumstance; news [13].
- knowledge or facts about someone or something [37].

Hence, the information which is used for this research will be knowledge or facts of recycled plastic material.

Effect:

- The result of a particular influence [4].
- Something that is produced by an agency or cause; result; consequence [12].
- A change that is produced in one person or thing by another [36].

Hence, an information effect in this research stands for an attitude change caused by information.

A decision-making process starts perceiving alternatives of a choice and their outcomes, values/risks, and other relevant factors. A brain analyzes the information and evaluates the alternatives [18]. There are 2 types of decision makers depending on how to use information. Some people make a decision as the rational decision theory [32]. The people aim to gather as much as possible information regarding the alternatives and making a decision based on the information [32]. However, in the real world, obtaining all relevant information is nearly impossible. In this circumstance, people make a decision according to the behavioral decision theory. In few words, people select one alternative if the people think that the alternative is “Good enough” [32]. It is an example how decision-making strategies influence on a selection. There are compensatory strategies which divide relevant information as negative or positive. When people use those strategies, a choice is done after evaluating all relevant information. On the other hand, non-compensatory strategies employ insufficient information and skip alternatives if there is negative information once [32].

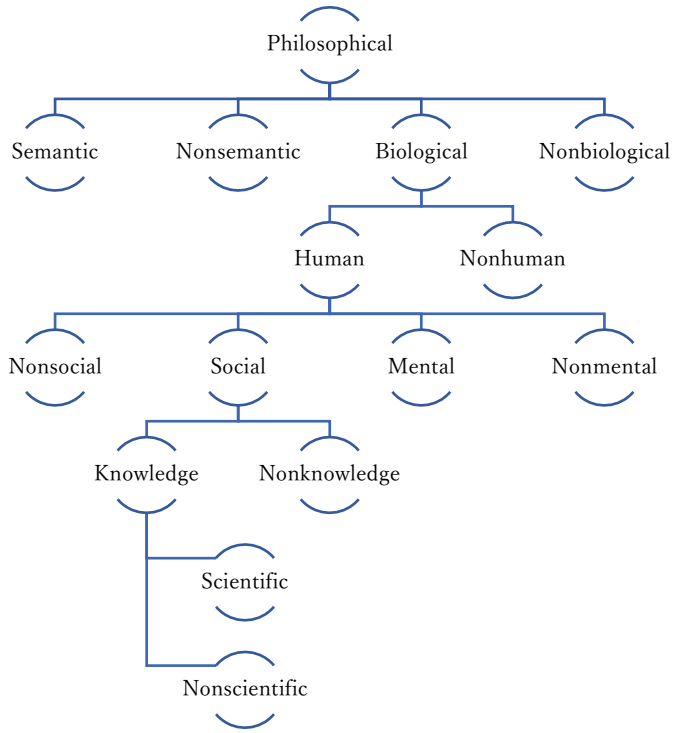


Figure 2-3. The range of information definitions divided into different parts [52]

By 1988, the number of definitions regarding information had been reached over 400. Messages, news, data, knowledge, documents, literature, intelligence, symbols, signs, hints, tips, and what is gathered by some special agencies are considered as information [52].

2.1.2.Research method review

To explore a relationship between web-search stance and decision making, Rod Roscoe and his colleagues requested participants to choose 3 bottled waters among 15 samples. After that, their knowledge related with bottled water was investigated. Participants were allowed to search relevant information regarding bottled water on the internet. The second choice came after the search [43]. Another research which used bottled water aimed to investigate customer's WTP. The researchers provided respondents with 8 messages regarding plastic materials and requested their choice after each message. A general content of the messages was regarding plastic pollution, environment effects and biodegradable plastic [8]. There is another example that a risk perception of chemical products was measured after providing information related with evaluation of its hazard. A similar process was done after instructions of the chemical product [45].

Adriaan Kole and his colleagues (2009) researched information effects on a product value. The researchers classified participants into groups in 4 different conditions of information and compared data from the groups. For example: participants in the 1st

group received information of product origin (wild or farmed), while the 2nd group was provided messages regarding product freshness. After the information, there were questions to measure their attitude [1]. Another similar research investigated a recycling attitude and behavior of American citizens. The researchers provided different messages to participants and afterwards asked their choice [30]. Likewise, there is a research which investigated a consumer choice of packaging material and recyclability. In the research, researchers divided participants into 3 groups. The 1st group made their choice without any information. Participants in the 2nd group enabled to search information to judge alternatives. The last group members watched a video regarding recycling and requested their choice after that [31]. The method to divide into different conditions of information employed to discover a relationship between information and motivation for recycled water. The researchers provided basic information of the water to all participants. The participants were divided into several groups. The 2nd and 3rd groups were provided more information related with environment, pollution, and mineral provision of water, respectively [29]. Tom Meyvis and Chris Janiszewski researched irrelevant-information effects on a consumer perception [47]. 2 different methods were used for the purpose. The first method was that participants received 1 supportive information with several irrelevant pieces of information regarding the product. After the information, they must refer their belief in benefits of the product. As the second method, the irrelevant information was judged as true or false through showing product replicates.

Another method to measure a relationship between information and a purchase decision is that Franco Mawad and his colleagues prepared 16 yogurt labels with different information pieces (images, title, ingredient, etc). Participants were requested to select among the samples. During the selection, eye movement of the participants was being recorded by an eye-tracker software [15]. Some researchers asked the relationship by simple and direct questions [26]. Likewise, to explore a consumer attitude to eco-packaging, some researchers aimed to know a consumer preference for products in eco-packaging and their based knowledge. There was a close-ended question to investigate the preference [16].

2.1.3. Previous relevant findings

Kelly S. Fielding and her colleague investigated information effectiveness in a case of recycled water. The researchers provided messages related with a process of water recycling and its safety. As a result, there was a difference before and after receiving the information. Respondents believed the safety of recycled water more than before [29]. Some researchers investigated an effect of irrelevant information. Logically, there would be no effect. According to the results, there were negative effects from irrelevant information. It was reducing influence of supportive information [47]. There were several factors which seemed not to have direct relevance with customers. However, the factors, brand sales rates, evaluation, and recommendations of experts could influence on respondent attitudes [26]. In addition, electronic referral has a potential to affect both of expectations and satisfaction of consumers as well. Particularly, its effect on new consumers is strong. Likewise, consumers who used the product before was even affected by the referral [9].

In contrast, there is an example that positive information affects negatively. Some researchers investigated a difference between information effects depending on information types in a case of cod (fish) fillets. The researchers prepared 6 groups in different conditions of information. In addition, one of the important differences was fish types. It was a significant factor. Participants received wild or farmed cods. Information regarding advantages of farmed cod reduced a consumer preference for the fish [1].

2.3 Summary

To research a customer preference for a recycled-plastic water bottle, it is essential to distinguish participants whether a customer of bottled water or not. There must be at least two alternatives including new and recycled bottles. Demographics is a basic source of possible factors. A prime difference between the bottles should be considered as a factor as well. Assumptions related with the factors can be examined in the same way.

It is difficult to change a customer decision or preference by one piece of news. Therefore, it is necessary to use an attitude interval to measure it. A Likert point-scale measures customer attitude, perception, and preference. Likewise, product attributes are evaluated by the method. A 5-point scale is more suitable for this research.

There must be news pieces for changing a customer attitude. To investigate a difference between information effects depending on information types, several pieces of news will be required. The pieces should target at basic factors of decision-making such as outcome beliefs, value/risk and probability. There should be news relating with the environment and irrelevant information with customers and product. A difference between negative and positive news will be an important finding of this research.

Chapter 3
Research design

Chapter 3 introduces research questions and data necessity. A questionnaire structure covers questions and answers for obtaining necessary data and a relation between them. It includes news which is designed for this research and appearance. At last, information regarding sampling method, the number of participants and distributed questionnaire is included.

3.1 Research question

MRQ: how does information influence on customer attitudes for a recycled plastic bottle in Mongolia?

SRQ-1: How do Mongolian customers perceive a recycled plastic bottle? –the question covers customer preferences for new and recycled plastics. It investigates customer attitudes to the bottles. As a result, determinants of the preference will be discovered.

SRQ-2: How much does information affect the customer attitude? –the first attitude of customers will be asked, first. The customers receive relevant information after referring their first attitude. The second attitude will be evaluated after the information.

SRQ-3: What are customer attitudes to a plastic bottle recycled by Mongolian company? - The question examines a hygiene perception of recycled plastic in Mongolia. A difference between plastic recycling countries, Mongolia and Japan will be discovered. At last, a customer attitude to products made from recycled plastic by Mongolian companies will be investigated.

3.2 Data necessity

Table 3-1: Data necessity for each of the sub research questions.

SRQ-1: How do Mongolian customers perceive a recycled plastic bottle?	
1	Mongolian customers of bottled water
2	Customer choice between the bottles
3	Customer features depending on the choice
4	Customer attitude to the choice
SRQ-2: How much do information types influence on the customer attitude?	
1	Attitude points changed by information
2	The changed points as information types
SRQ-3: What are customer attitudes to a plastic bottle recycled by Mongolian company?	
1	Hygiene perception of a water bottle recycled in Mongolia
2	A comparison between Mongolia and other plastic recycling countries
3	Whether to buy bottled water in a water bottle recycled by Mongolian company

3.3 Questionnaire structure

Table 3-2: Text which refers a survey purpose in the questionnaire.

1	Purpose	Text	A purpose of the survey is to research customers' attitude to packaging of bottled water and information effect on the attitude.

SRQ 1.1 Who is a customer of bottled water in Mongolia?

Table 3-3:Question and answer for obtaining data for SRQ 1.1

1	Customer or not	Question	Do you buy bottled water?
		Answer	a. Yes b. No
			(If respondents answer yes, ask the below detail questions)
2	Which bottled water	Question	Which one of the below bottled waters do you usually buy?
		Answer	a. 330ml b. 500ml c. 1.5 Liter d. 5 Liter e. 20 Liter
3	Usage reason	Question	When do you buy bottled water?
		Answer	a. Going on a trip or traveling
			b. Doing sport
			c. Walking or being in a car on a hot day
			d. Attending conference or event

SRQ 1.2 What is a customer preference for recycled and new plastic bottles?

Table 3-4:Question and answer for obtaining data for SRQ 1.2

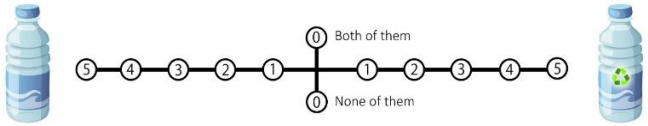
1	Customer choice	Question	Which bottled water do you buy if there are ones made from recycled and virgin plastics on a bar?
		Answer	a. Bottled water in a virgin-plastic bottle
			b. Bottled water in a recycled-plastic bottle
			c. Both
			d. None of them

SRQ 1.3 What are customer differences depending on the preferences?

This question will be answered after comparing and analyzing data from the other questions.

SRQ 1.4 What are customer attitudes to recycled and new plastic bottles?

Table 3-5:Question and answer for investigating a customer attitude

1	Customer attitude	Question	Please evaluate your choice. /from 1- "uncertain" to 5- "certain"/
		Answer	

According to the summary (p.16), a Likert point scale will be used to measure customer attitudes. Moreover, a 5-point scale is common and suitable. The above point scale integrated and covered all options

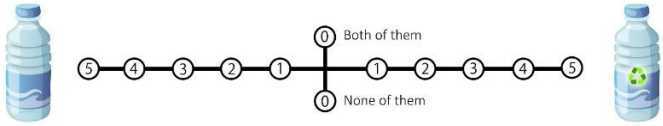
Table 3-6: Question and answer for exploring customer perceptions and experience

1	A perception of impurity	Question	Does a virgin-plastic bottle contain impurity?
		Answer	a. Yes b. No c. Maybe d. Maybe not f. I don't know
2		Question	Does a recycled-plastic bottle contain impurity?
		Answer	a. Yes b. No c. Maybe d. Maybe not f. I don't know
3	A perception of health impact	Question	Does a recycled plastic bottle effect on human health?
		Answer	a. Yes b. No c. Maybe d. Maybe not f. I don't know
4	Usage experience	Question	Have you ever used recycled plastic product?
		Answer	a. Yes b. No c. Maybe d. Maybe not f. I don't know

The "Maybe" and "May be not" answers are added because some respondents cannot answer the above questions precisely. The answers will support for referring their attitude. The other possible factors, demographics and origin of country will be asked by the below questions.

SQR 2.1 How much does information influence on a customer attitude?

Table 3-7:News design, question, and answer for discovering information effect.

<table>
<tr><td rowspan="2">1</td><td rowspan="3">Attitude changed by information</td><td>Providing information</td><td>Please read the follow information</td></tr>
<tr><td></td><td> 
</td></tr>
<tr><td>Note: We cannot prove that this news is genuine because it is from the internet.</td></tr>
<tr><td rowspan="2">2</td><td>Question</td><td>Please evaluate your choice again. /from 1- “uncertain” to 5- “certain”/</td></tr>
<tr><td>Answer</td><td> 
</td></tr>
</table>

The information appearance was designed to seem reading news on a smart phone. According to the summary (p.16), the second choice will be requested after providing information.

SRQ 2.2 How much do information types effect on customer attitudes?

According to the literature [32], there are 5 pillars of decision-making. Negative and positive pieces of news are written for influencing on the pillars except for the alternative and the differential importance. A reason of skipping some pillars is that alternatives are an object of a decision and thus not a factor to change. A differential importance will be concluded by comparing positive and negative news pieces and therefore it is not an

object to be changed by a news piece. The following table 3-8 shows content and purposes of the news pieces. For example: There are 2 pieces of news aimed to influence on a customer perception of product outcome. One of the 2 pieces includes positive message, whereas the other one has negative one. News which aimed at the pillars included advices from experts, experiment results and relevant statistics. In total, 10 pieces of news related with recycled plastic are prepared for the purpose (table 3-9).

Table 3-8:Concepts which should be included in news pieces to be used for the research

		Impurity and health			Environment	Other
Positive	5	1	1	1	1	1
		Outcomes	Value	Occur probabilistically	good effect	positive news
Negative	5	1	1	1	1	1
		Outcomes	Risk	Occur probabilistically	bad effect	negative news
Included contents		Advice from experts	Advice from experts	Advice from experts		
		Result - experiment	Result - experiment	Result - experiment		
		Statistics	Statistics	Statistics		

Table 3-9:Concepts which should be included in the news pieces to be used for the research

1	Outcome	Positive	**(2) Title:** Recycled-plastic product can match the usage standard of Mongolian athletes There are some questions regarding recycled product among people, “Is impurity of waste plastic removed after recycling?”, “Is it bad for human health?” and so on. From this year, Mongolian athletes can use bottled water in a recycled plastic bottle. Health impact and hygiene of the water in a recycled plastic bottle was inspected among the athletes who were drunk after exercise. As a result, the water was pure. It shows that the bottled water matches hygiene standards and has no effect on human health.

		Negative	**(1) Title:** Forbade recycled-plastic product to athletes There are some questions regarding recycled product among people, “Is impurity of waste plastic removed after recycling?”, “Is it bad for human health?” and so on. From this year, Mongolian athletes have been forbidden to use bottled water in a recycled plastic bottle. Inspection of health and hygiene was done among the athletes who were drunk water in a recycled plastic bottle. As a result, impurity level was 23.5%. It shows that the bottled water cannot match hygiene standard and is bad for human health.
2	Value/Risk	Positive	**(7) Title:** Difference between recycled and new plastics International experts conducted some interesting experiment. The experts collected 153 plastic items from a landfill site and recycled them. A result of the experiment was noticeable. The recycled plastics became clearer than some metals, iron, aluminum, and cetera. After this result, the experts would research it with new plastic. However, the experts stopped the experiment. A reason is that hygiene of the recycled plastic was the same with new one.

		Negative	**(3) Title:** Difference between recycled and new plastics International experts conducted some interesting experiment. The experts collected 153 plastic items from a landfill site and recycled them. A result of the experiment was noticeable. After this result, the experts would research it with new plastic. However, the experts stopped the experiment. A reason is that any index of hygiene and health impact of the recycled plastic was lower than the new one apparently. In some cases, it was dangerous for human health.
3	Occur probabilistically	Positive	**(9) Title:** Good news from international experts for Mongolian International experts inspected recycled plastic products to be sold in …… province/district/city. According to the inspection, sanitation of the products could match relevant standards. Furthermore, water bottles made from recycled plastic scored 100% and thus products in plastic packaging in the city have no impurity.
		Negative	**(10) Title:** Caution from international experts to citizens of …… province/district/city International experts inspected recycled plastic products to be sold in …… province/district/city. According to the inspection, sanitation of the products was inadequate and lower than rates of some poor countries. Furthermore, water bottles made from recycled plastic scored 23.5% and thus products in plastic packaging in the city have impurity and a bad effect on human health.

4	Environment	Positive	**(8) Title:** Let's save the world by choosing recycled plastic Plastic waste is one of the biggest environment polluters in the world. Wild animals are entangled and harmed by plastic. Some animals eat it and die due to digestion. By 2050, according to the research, an amount of wasted plastic into the ocean will become greater than an amount of all fish in the ocean. 1 million plastic bottles have been being wasted in the world per minute so far. Therefore, choosing recycled plastic is important for decreasing plastic pollution.
		Negative	**(6) Title:** Recycled plastic has a bad effect on the environment After recycling plastic, properties of the plastic are changed and becomes more breakable and inflexible. The emission of CO_2 (carbon dioxide) of the plastic rises a lot and a degrading period is extended by 100-200 years. Furthermore, it spreads faster than the new one. Therefore, recycled plastic is more harmful than new plastic.
5	Other	Positive	**(4) Title:** Recycled plastic becomes a choice of Global brands Global brands such as Adidas and Nike started using abandoned plastic in the ocean as raw material. 80% of sport boots is made from recycled plastic. Over 1 million and 5 million sport boots of the "Adidas" brand were made from recycled plastic in 2017 and 2018, respectively. In 2019, the brand planned to reach the amount to 11 million. The "North Face", "Aday", "Beyond Skin", "Rothy's", "Andi", "Vivobarefoot", "Patagonia" and "Bhava" brands use recycled plastic as well.

		Negative	**(5) Title:** Do not drink water if horse does not drink it. A company which produces plastic trough of farm had to select new plastic or recycled plastic as raw material. To decide it, a manager of the company studied and compared the 2 types of plastic. As a result, there was no proof that recycled plastic is pure. Instead, there were several recommendations how to use it. After that, the manager produced 2 troughs from recycled plastic and new plastic. The troughs are placed in a horse stall and filled by water. No horse drunk water in the recycled-plastic trough. The result was obvious. There is a proverb that drink the water if horse drinks. Likewise, do not drink the water if horse does not.

Numbers with the titles are news' codes inputted into SPSS software.

SQR 3.1 How do customers perceive hygiene of plastic recycled in Mongolian?

Table 3-10:Question and answer for exploring customer perception of hygiene

1	A perception of hygiene	Question	Can plastic recycled in Mongolia match hygiene standards?
		Answer	a. Yes b. No c. Maybe d. Maybe not f. I don't know

SRQ 3.2 How do customers perceive a difference between plastics recycled in Mongolia and Japan?

Table 3-11:Question and answer for exploring a difference between plastic recycling countries

1	Country origin	Question	Is there any difference between bottles recycled in Mongolia and Japan?
		Answer	a. Yes b. No c. Maybe d. Maybe not f. I don't know

SRQ 3.3 How do customers perceive a plastic bottle recycled by Mongolian companies?

Table 3-12: Question and answer for exploring a difference between plastic recycling countries

1	Opportunity	Question	Would you buy a bottled water in packaging made from recycled plastic by Mongolian companies?
		Answer	a. Yes b. No c. Maybe d. Maybe not f. I don't know

Table 3-13: Demographics

1	Age	Question	What is your age group?
		Answer	a. 18-25 b. 26-35 c. 36-45 d. 46-55 e. 56 and over
2	Gender	Question	Are you a man or a woman?
		Answer	a. Man b. Woman
3	Education	Question	Education:
		Answer	a. 4th grade or less b. 8th grade c. 12th grade d. bachelor's degree e. post-graduate degree
4	Region	Question	Province:
		Answer	….....

Table 3-13:Notification

1	Fake news notification	text	The above information is not real. It is written only for the research.

Complete questionnaire – (appendix 6)

3.4 Sampling

This research was conducted in Mongolia in September 2019. Geographical clustered sampling was employed. Firstly, Mongolian population was divided into 3 regions (east, west, and middle). A reason of the division was that the shape of Mongolian land is vertical (appendix 4).

Nearly half (45.3%) of Mongolian population lives in Ulaanbaatar, capital city. The city is in the middle region. The region included only the capital city due to a large proportion of the population. 660 questionnaires were distributed in 6 districts of the city. In the west region, 220 questionnaires were distributed in “Erdenet” and “Darkhan” cities. Mongolian provinces or cities on the right side of the capital city was included in the west region. In the east region, 156 questionnaires were handed out to respondents in “Baganuur” district, “Gobisumber” and “Dornogobi” provinces (appendix 5). A conventional method was employed to choose provinces and cities which conducted this survey.

Chapter 4
Research result

Chapter 4 starts with a description of gathered questionnaires and its composition. In this chapter, Mongolian customers of bottled water are determined. Their preference and comparison are introduced. Customer attitudes are measured as well. There are calculation and comparison of information effect. It includes analysis of customers' perception of plastic bottles recycled by Mongolian companies.

The survey was conducted in September 2019. It involved 1049 Mongolian respondents. 925 questionnaires were usable for this research. 793 respondents were a customer of bottled water. 38.2% of all respondents was young adults (18-25 years old). Respondents aged 26-35 made up 26.1%. Age groups "36-45" and "46-55" accounted for 18.5% and 11%, respectively. Respondents aged 56 and over covered 5.8% (appendix 1). Men and women made up 38.5% and 61.5% of respondents, respectively (appendix 2). In terms of education level, respondents at 4th grade, 8th grade and 12th grade formed 3.8%, 27.8% and 19.4% of all respondents, respectively. Bachelor's and postgraduate degrees covered 41.5% and 7.6% (appendix 3).

4.1 Customer of bottled water

SRQ 1.1 Who is a customer of bottled water in Mongolia?

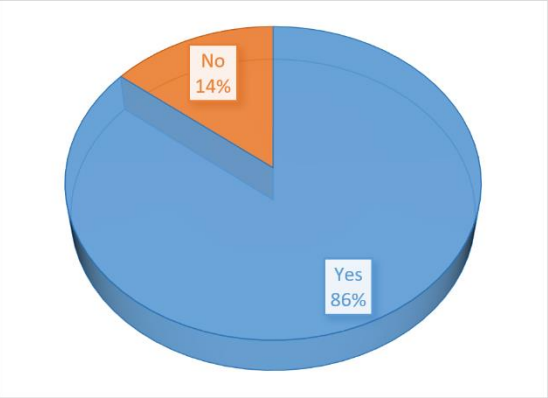


Figure 4-1: Proportion of respondents who buy bottled water and do not.

The pie chart (figure 4-1) illustrates a ratio of respondents who buy bottled water to ones who do not. Nearly 9 of 10 respondents referred to buy bottled water.

Age: The table 4-1 displays the ages of respondents with the above difference. As a result, customer respondents covered 84%-89% of each age group. It keeps the above ratio (86:14) as well. On the other hand, respondents who do not buy bottled water accounted for 11%-16% of age groups.

Table 4-1:Respondent Choice * Age Group Crosstabulation

	What is your age group?										
Do you buy bottled water?	18-25		26-35		36-45		46-55		56 and over		Total
Yes	296	84%	211	88%	146	85%	93	89%	46	85%	792
No	57	16%	30	12%	25	15%	12	11%	8	15%	132
Total	353	100%	241	100%	171	100%	105	100%	54	100%	924

Gender: Women and men who buy bottled water made up 88% and 83% of respondents, respectively (table 4-2). There was no significant difference.

Table 4-2:Respondent Choice * Gender Crosstabulation

	Are you a man or a woman?				
Do you buy bottled water?	Man		Woman		Total
Yes	295	83%	498	88%	793
No	61	17%	71	12%	132
Total	356	100%	569	100%	925

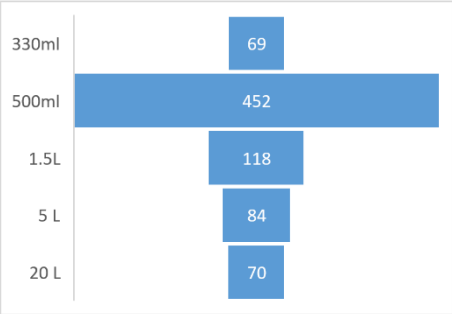


Figure 4-2: Respondent preference for water sizes

Bottled water size: The funnel chart (figure 4-2) shows a respondent choice of the water sizes. a 500ml bottled water is highlighted in there. The water was selected at least 4 times as many as the others. In the table 4-3, it is apparent that the biggest part (69%) of respondents aged between 18-25chose the water. 60% of the next age group (26-35) preferred it as well. Hence, if customer age becomes younger, a demand for the water rise.

As for the other water sizes, there is no significant difference. The proportions of respondents who selected the sizes in each age group are similar, 5%-13%, 8-26%, 9-16%, 9-13% and 7-15%, respectively.

Table 4-3:Water Size * Customer Age Crosstabulation

	How old are you?				
Which size do you usually buy?	18-25	26-35	36-45	46-55	56 and above
330ml	5%	9%	12%	12%	13%
500ml	69%	60%	47%	39%	33%
1.5 liter	8%	14%	22%	20%	26%
5 liter	10%	9%	10%	16%	13%
20 liter	7%	8%	9%	13%	15%

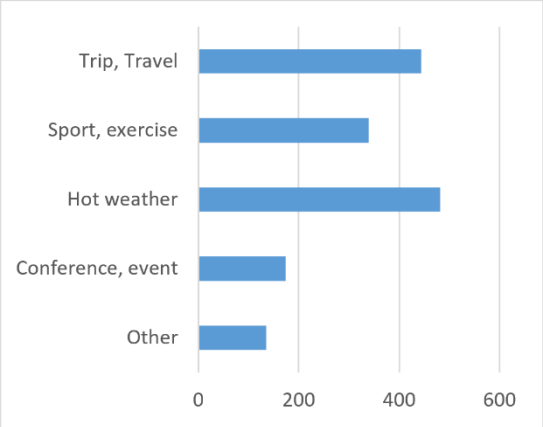


Figure 4-3: Usage purpose of bottled-water.

Usage purpose: Hot weather was a main reason to buy bottled water (figure 4-3). Its original answer was “walking or being in a car on a hot day”. Hence, people tend to drink the water when walking outside or being in a car on a hot day. Likewise, the second major reason was a trip and travel. People who go on a trip and travel usually buy bottled water in Mongolia. Doing sport and exercise was a noticeable reason as well. On the other hand, participating conference

or event, and other reasons are included in a minor reason.

4.2 Customer preference and comparison

SRQ 1.2 What is a customer preference for new and recycled plastic bottles?

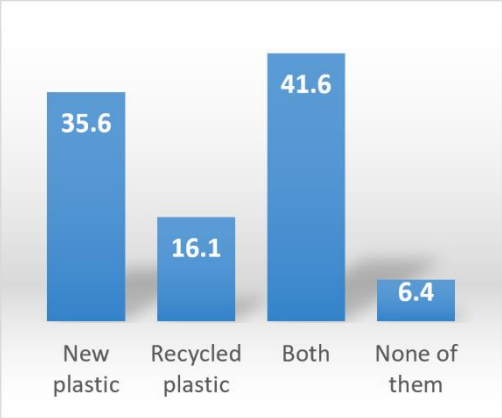


Figure 4-4: Respondent preference for plastic bottles

From this part, data from only customer respondents were analyzed. Therefore, hereafter, "respondent" refers a respondent who buys bottled water.

Customer choice: The chart (figure 4-4) shows that nearly half of respondents did not consider a difference between the bottles (hereafter, RPB) However, respondents who prefer a new bottle (hereafter, RPN) were over twice as many as respondents who prefer a recycled bottle (hereafter, RPR). Only 6.4% of respondents refused to choose a plastic bottle (hereafter, RRP) (table 4-4).

Table 4-4: Respondent preference for packaging material

	Frequency	Percent	Valid Percent	Cumulative Percent
A water in a virgin-plastic bottle	282	35.6%	35.7%	35.7
A water in a recycled-plastic bottle	128	16.1%	16.2%	51.8
Both	330	41.6%	41.7%	93.6
None of them	51	6.4%	6.4%	100.0
Total	791	99.7%	100%	
Missing System	2	0.3		
Total	793	100%		

SRQ 1.3 What are customer differences depending on their preference?

Age – Choice: The cross tabulation (table 4-5) shows age proportions of respondents who chose different alternatives. According to the table, 40% of the respondents aged 18-25 did not a particular choice. RPN had a higher proportion (30%) than RPR (23%). Furthermore, that tendency was kept in any age group. Finally, the least proportions were belonged to RRP. There is the apparent tall column (figure 4-5). It shows that the oldest respondents tended to choose a new bottle.

Table 4-5:Choice * Age Group Cross tabulation

	How old are you?				
	18-25	26-35	36-45	46-55	56 and above
New bottle	30%	35%	39%	38%	63%
Recycled bottle	23%	14%	11%	12%	11%
Both	40%	46%	45%	42%	22%
None	7%	6%	5%	9%	4%

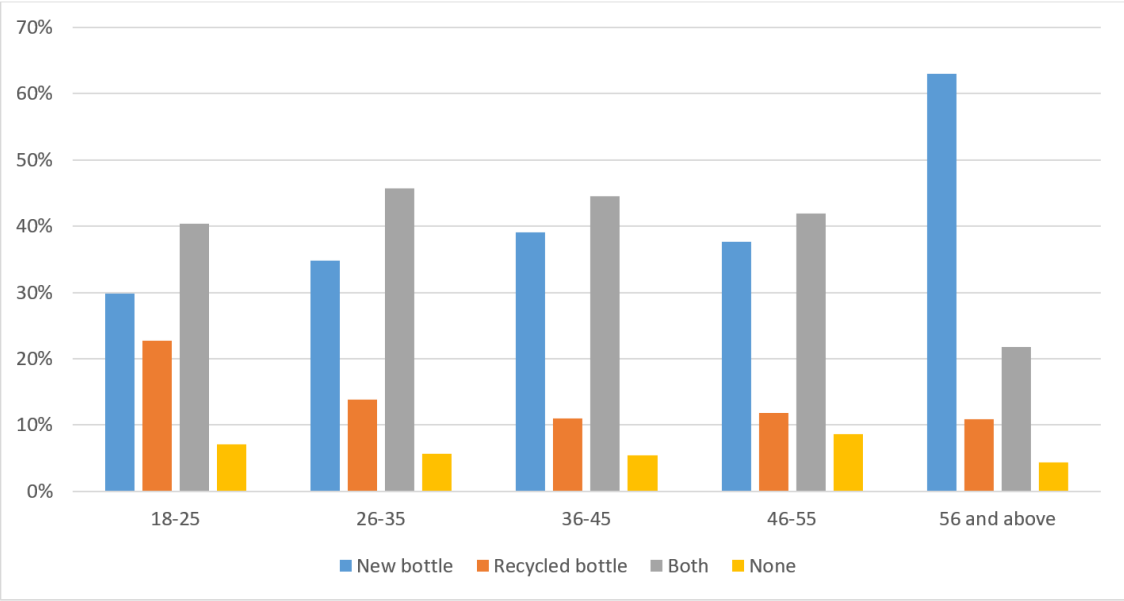


Figure 4-5: Respondent choices in age categories.

Table 4-6: Choice * Gender Crosstabulation

	Man	Woman
New bottle	34%	37%
Recycled bottle	16%	16%
Both	44%	41%
None	7%	6%

Gender - Choice: there was no significant difference (table 4-6), especially in the "recycled bottle" and "None of them" options. However, women preferred a new bottle little more than men.

Education – Choice: The table 4-7 shows the education level of respondents. Except for respondents at 4th grade or less, a customer preference for a recycled bottle tends to fall off if the education level of respondents goes down. Furthermore, respondents at 8th grade preferred a new bottle the most. In any education level, most respondents did not

make a particular choice. The grey columns in the clustered bar chart (figure 4-7) displays this respond.

Table 4-7: Choice * Education Crosstabulation

	4th grade or less	8th grade	12th grade	bachelor's degree	post-graduate degree
New bottle	20%	40%	35%	36%	29%
Recycled bottle	33%	14%	9%	18%	23%
Both	33%	40%	49%	41%	39%
None	13%	6%	7%	5%	10%

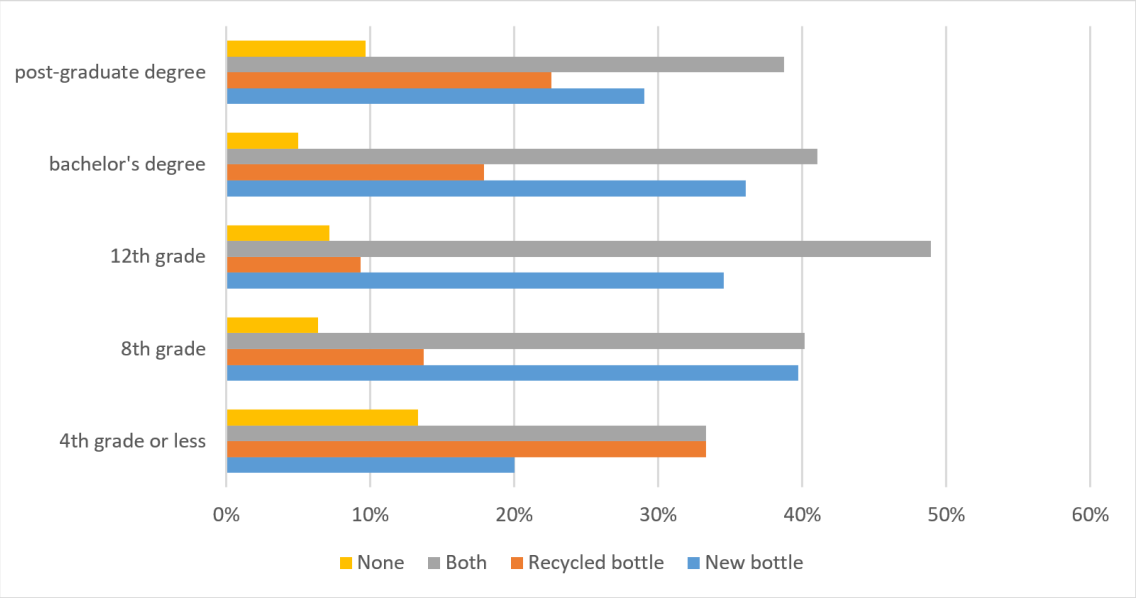


Figure 4-6: Respondent choice in education level categories

Usage experience: The following table 4-8 displays how respondents referred their usage experience of recycled plastic product. There are many more RPN who think not to use the product. Ones who responded the same accounted for 39%, whereas 33% of RPN answered to use it. 60% of RPR stated to employ the product. It shows that if people think to use it, they tend to choose a recycled bottle. Likewise, most of the other respondents stated to have the experience of product usage.

Table 4-8: Choice * Usage Experience Cross tabulation

	Have you ever used recycled plastic product?				
	Yes	Maybe	I don't know	Maybe not	No
New bottle	14%	19%	28%	5%	34%
	33%			39%	
Recycled bottle	24%	36%	13%	5%	22%
	60%			27%	
Both	15%	26%	28%	9%	22%
	42%			31%	
None	29%	18%	27%	4%	22%
	47%			25%	

Perception of impurity: The table 4-8 shows respondent perceptions of impurity of a recycled plastic bottle. As the results, roughly 28% of respondents stated not to know regarding the impurity. There are respondents who assumed that it has impurity. They made up 48% of respondents. It shows that nearly half of respondents perceive the bottle with impurity. They are twice as many as the ones who do not. Even 40% of RPR agreed what the impurity is. The other respondents tended to answer in the same way.

Table 4-9: Choice * Perception of Impurity Crosstabulation

	Does a recycled-plastic bottle contain impurity?				
	Yes	Maybe	I don't know	Maybe not	No
New bottle	17%	41%	27%	6%	9%
	59%			15%	
Recycled bottle	8%	32%	26%	17%	17%
	40%			34%	
Both	8%	35%	34%	9%	15%
	42%			24%	
None	18%	33%	25%	8%	16%
	51%			24%	

Perception of health impact: The below table 4-10 displays respondent perceptions of health consequence of a recycled plastic bottle. Most of RPN perceive that the bottle

influences on human health (57%). RPB tended to have the same perception. In contrast, 35% of RPR referred that it had not, whereas ones who agreed the effect accounted for 37%. RPR covered the largest proportion of respondents who disagreed the impact.

Table 4-10: Choice * Perception of Health impact Tabulation

<table>
<tr><td rowspan="2"></td><td colspan="5">Does a recycled plastic bottle impact on human health?</td></tr>
<tr><td>Yes</td><td>Maybe</td><td>I don't know</td><td>Maybe not</td><td>No</td></tr>
<tr><td rowspan="2">New bottle</td><td>21%</td><td>36%</td><td rowspan="2">26%</td><td>6%</td><td>11%</td></tr>
<tr><td colspan="2">57%</td><td colspan="2">17%</td></tr>
<tr><td rowspan="2">Recycled bottle</td><td>9%</td><td>27%</td><td rowspan="2">28%</td><td>21%</td><td>16%</td></tr>
<tr><td colspan="2">35%</td><td colspan="2">37%</td></tr>
<tr><td rowspan="2">Both</td><td>7%</td><td>32%</td><td rowspan="2">35%</td><td>12%</td><td>14%</td></tr>
<tr><td colspan="2">39%</td><td colspan="2">26%</td></tr>
<tr><td rowspan="2">None</td><td>18%</td><td>31%</td><td rowspan="2">25%</td><td>16%</td><td>10%</td></tr>
<tr><td colspan="2">49%</td><td colspan="2">25%</td></tr>
</table>

4.3 Customer attitude

SRQ 1.4 What are customer attitudes to recycled and new plastic bottles?

The following table 4-18 shows how respondents evaluated their attitudes to the bottle chosen by them. There are 5 points to evaluate it. the "0" point covered both of respondents who answered "both" and "none of them". Because those respondents did not prefer one bottle to the other. The largest number of respondents was included in the "0" point. A reason might be the above integration. There were many more RPN who filled "-5" than the other points. The largest number of RPR scored the "+5" point as well. Hence, it is possible to conclude that both of RPN and RPR tend to have the strong beliefs in their preference.

Table 4-11: Respondent attitudes to the bottles

	Frequency	Percent	Valid Percent	Cumulative Percent
1.00	20	2.5	2.5	2.5
2.00	12	1.5	1.5	4.0
3.00	29	3.7	3.7	7.7
4.00	16	2.0	2.0	9.7
5.00	56	7.1	7.1	16.8
.00	387	48.8	48.8	65.6
-1.00	25	3.2	3.2	68.7
-2.00	11	1.4	1.4	70.1
-3.00	56	7.1	7.1	77.2
-4.00	33	4.2	4.2	81.3
-5.00	148	18.7	18.7	100.0
Total	793	100.0	100.0	

Note: The first column shows customer attitude points. The numbers from "1" to "5" are attitudes towards a recycled plastic bottle (from "weak" to "strong"). "0" represents the "None of them" and "Both" answers. The points "-1" to "-5" are attitudes towards a new plastic bottle. These are the first choice of respondents.

The table 4-19comparesbetween age proportions of respondents who evaluated their attitude as “+5”and “-5”. It is possible to see that respondents aged 18-35 and preferred a recycled bottle accounted for 85.8%, whereas the percentage of a new bottle is 54%. Hence, young adults tend to be in a side of a recycled bottle. The next table (4-20) shows differences from respondent gender. In both categories, women made up the largest percentage. However, the percent of men who preferred a recycled one is higher than the percentage of ones who chose a new bottle, whereas women are opposite. It shows that women prefer a new bottle and men tend to choose a recycled one. As for education, respondents at 8th and 12th grades preferred a new bottle. Ones at the other education levels chose a recycled bottle.

Table 4-12: A comparison between respondents who filled “5” and “-5” as age

	Recycled “5”		New “-5”	
	Frequency	Percent	Frequency	Percent
18-25	31	55.4	44	29.7
26-35	17	30.4	36	24.3
36-45	1	1.8	29	19.6
46-55	5	8.9	21	14.2
56 and above	2	3.6	18	12.2
Total	56	100.0	148	100.0

Table 4-13:A comparison between respondents who filled “5” and “-5” as gender

	Recycled “5”		New “-5”	
	Frequency	Percent	Frequency	Percent
Male	24	42.9	53	35.8
Female	32	57.1	95	64.2
Total	56	100.0	148	100.0

Table 4-14: A comparison between respondents who filled "5" and "-5" as education

	Recycled "5"		New "-5"	
	Frequency	Percent	Frequency	Percent
4th grade or less	7	12.5	4	2.7
8th grade	11	19.6	52	35.1
12th grade	4	7.1	21	14.2
bachelor's degree	29	51.8	59	39.9
post-graduate degree	5	8.9	12	8.1
Total	56	100.0	148	100.0

4.4 Factors of customer attitude

To discover factors of the customer attitude, Pearson's r correlation was computed (table 4-15). The points from "-5" to "+5" were ordered from 1 to 11 (there was "0" points as well). A reason is that the order was based on customer attitude to a recycled plastic bottle. Likewise, the answers "yes", "maybe", "I do not know", "maybe not" and "no" were inputted as from 1 to 5.

According to the assumption, there were 6 possible factors, age, education, perception of impurity, perception of health impact, usage experience and country of origin. There were 4 independent variables which have a significant correlation with the dependent variable. They were age, perceptions of impurity and health impact and usage experience of recycled plastic products. The perception of health impact had the highest correlation coefficient with customer attitude. However, correlation coefficients of the factors with the attitude were less than 0.5.

Table 4-15: Correlation between customer preference and its possible factors

Correlations

		Customer attitude	How old are you?	Education	Does a recycled-plastic bottle contain impurity?	Does a recycled plastic bottle effect on health?	Have you ever used recycled plastic product?	Is there any difference between bottles recycled in Mongolia and Japan?
Customer attitude	Pearson Correlation	1	-.172**	.038	.180**	.209**	-.163**	-.007
	Sig. (2-tailed)		.000	.289	.000	.000	.000	.844
	N	793	792	793	792	793	793	793
How old are you?	Pearson Correlation	-.172**	1	-.008	.018	-.108**	.067	.064
	Sig. (2-tailed)	.000		.825	.611	.002	.059	.072
	N	792	792	792	791	792	792	792
Education	Pearson Correlation	.038	-.008	1	-.074*	.021	-.037	-.103**
	Sig. (2-tailed)	.289	.825		.037	.564	.293	.004
	N	793	792	793	792	793	793	793
Does a recycled-plastic bottle contain impurity?	Pearson Correlation	.180**	.018	-.074*	1	.357**	-.004	.061
	Sig. (2-tailed)	.000	.611	.037		.000	.921	.087
	N	792	791	792	792	792	792	792
Does a recycled plastic bottle	Pearson Correlation	.209**	-.108**	.021	.357**	1	.018	.095**

effect on health?	Sig. (2-tailed)	.000	.002	.564	.000		.605	.007
	N	793	792	793	792	793	793	793
Have you ever used recycled plastic product?	Pearson Correlation	-.163**	.067	-.037	-.004	.018	1	.053
	Sig. (2-tailed)	.000	.059	.293	.921	.605		.133
	N	793	792	793	792	793	793	793
Is there any difference between bottles recycled in Mongolia and Japan?	Pearson Correlation	-.007	.064	-.103**	.061	.095**	.053	1
	Sig. (2-tailed)	.844	.072	.004	.087	.007	.133	
	N	793	792	793	792	793	793	793

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

4.5 Information effect on customer attitude

SQR 2.1 How much does information influence on a customer attitude?

Information effect calculation: It is a variation between the first and second attitude scores. For example: if a respondent scored "5" and received information, then the respondent fills out "3", changed points are "2" (figure 4-8).

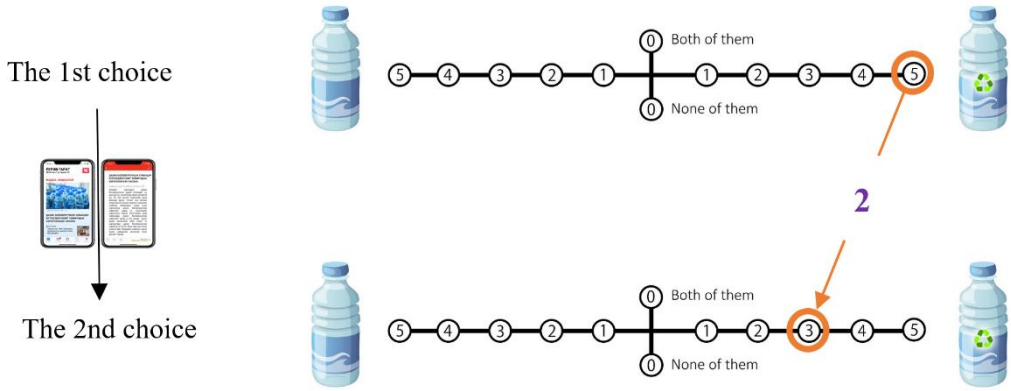


Figure 4-7: Information-effect point

The following table 4-19 displays the numbers of respondents who changed their first attitude and total changed points. The respondents who filled "0" and "-5" changed their attitude the most. It might depend on the respondent frequency. The largest number of respondents filled those points before the information (table 4-18). Therefore, it is possible that many more respondents than the others change their attitude in those categories. In a case of RPR, the correlation appeared as well. Most of RPR who changed their attitude filled "1". the "1" is the point which RPR scored the most before the information as well. Overall, the news pieces could affect respondents who had any attitude.

Table 4-16: Total points of the attitude change in each part of the interval

First attitude	Respondent	Total changed points
5	12	60
4	9	42
3	15	51
2	12	48
1	19	84
0	137	417

-1	12	44
-2	6	28
-3	26	99
-4	15	52
-5	45	253

The below table 4-20 shows the numbers of respondents who changed their attitude and choice. if respondents scored their first attitude on the side of a recycled bottle (figure 4-8) and changed it to the new bottle (or this action is opposite), it refers that the respondents changed their choice. As for calculation, logically, respondents who changed their choice must be included in the number of ones who changed their attitude. However, there were 31 respondents who changed their choice, but not included in the ones. A reason was that some respondents answered “both” and changed it to “None of them”. In this case, although those respondents changed their choice, they had no attitude points. Hence, the 31 respondents had no attitude change and thus were not included in the number.

Table 4-17: Respondents who changed their attitude and choice.

	Customer	**Respondents - changed attitude**	**Respondents - changed a choice**
Total	793	308	286

4.6 Information types and difference

SRQ 2.2 How much do information types effect on customer attitudes?

The following table 4-18 shows the average effect of each information type. The numbers of total attitude change were calculated by adding a variation of the first and second attitude evaluations on the same point scales. The next column shows frequency of respondents who received the information types which is in the same row. The "respondent changed" column shows the numbers of respondents who changed their attitude by the information. The average information effects were obtained by a division of total changed-attitude points by the number of respondents who changed their attitude. Illogical change is the number of respondents who changed their attitude to the opposite direction. In other words, if a respondent attitude becomes more negative after receiving positive information. it is considered as illogical.

There were 10 pieces of negative and positive news. The strongest negative news was "Forbade recycled-plastic product to athletes (title) - There are some questions regarding recycled product among people, "Is impurity of waste plastic is removed after recycling?", "Is it bad for human health?" and cetera. From this year, Mongolian athletes are forbidden to use bottled water in a recycled plastic bottle. Inspection of health and hygiene was done among the athletes who were drunk water in a recycled plastic bottle after exercise. As a result, impurity level was 23.5%. It shows the bottled water cannot match hygiene standard and is bad for human health." Its effect was "-5" point. An average effect of all negative news was "-4.36" points.

As for positive news, the "Difference between recycled and new plastics (title) International experts of plastic material did some interesting experiment. The experts collected 153 plastic items from dump site and recycled them. The result of the experiment was noticeable. The recycled plastics became clearer than some metals, iron, aluminum, and cetera. After this result, the experts would research it with new plastic. However, the experts stopped the experiment. The reason is that hygiene of the recycled plastic became the same with new plastic." news was the most influential positive news. An effect of the news was "+5.7" points. In general, an average effect of all positive news was "+4.88" points.

Hence, it is possible to conclude that positive news influences on a customer attitude more than negative one ($|-4.36| < |+4.88|$).

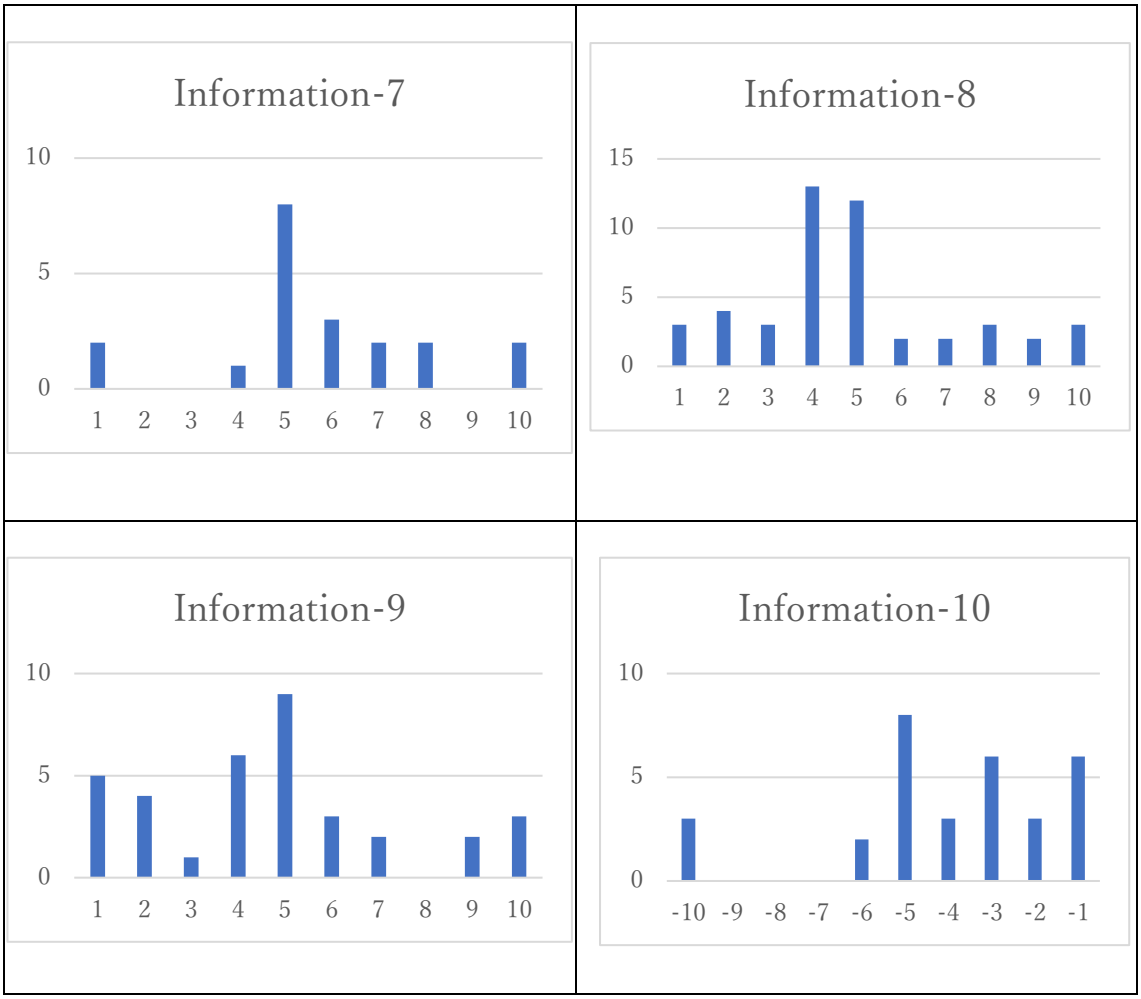
The next table 4-19 displays the number of effect points by each information type. The interesting result was that the largest number of effect points of most information types

was on 5 points. 8 of the 10 types showed the result. The 2 other types were information 5 and 8. The effect points of the information types were -3 and 4, respectively. Frequency on 1 point by information 4 was the same with the one on 5 points.

Table 4-18: Information effects on respondents who changed their attitudes.

Information type	Total attitude change	Respondent	Respondent changed	Average information effect	Illogical change
1	-165	80	33	-5	0
2	168	82	34	4.94	0
3	-91	59	20	-4.55	0
4	121	81	29	4.17	0
5	-95	65	22	-4.32	1
6	-137	98	35	-3.91	0
7	114	58	20	5.7	1
8	230	91	47	4.89	0
9	165	95	35	4.71	0
10	-124	84	31	-4	0

Table 4-19: Information effects of each news type


Information-7
10
5
0
1 2 3 4 5 6 7 8 9 10
Information-8
15
10
5
0
1 2 3 4 5 6 7 8 9 10
Information-9
10
5
0
1 2 3 4 5 6 7 8 9 10
Information-10
10
5
0
-10 -9 -8 -7 -6 -5 -4 -3 -2 -1

4.7 Hygiene perception of recycled plastic

SRQ 3.1 How do customers perceive hygiene of plastic recycled in Mongolia?

The following table 4-22 shows how respondents perceived hygiene of plastic recycled in Mongolia. RPN who did not believe the hygiene accounted for 36% of all RPN, whereas ones who thought that the plastic could match the standard made up 32%. Likewise, 41% of RRP perceived not to match. RPN and RRP tended not to believe hygiene of the recycled plastic. On the other hand, RPR and RPB tended to agree that the plastic could match the standards.

Table 4-20: Customer perception of hygiene standard

	Can plastic recycled in Mongolia match hygiene standards?					Total
	Yes	Maybe	I don't know	Maybe not	No	
Total	12%	27%	31%	15%	15%	100%
A new bottle	11%	21%	32%	17%	19%	100%
	32%			36%		
A recycled bottle	13%	41%	18%	15%	13%	100%
	54%			28%		
Both	12%	29%	34%	13%	12%	100%
	40%			25%		
None of them	10%	16%	33%	20%	22%	100%
	25%			41%		

4.8 Customer perception and product origin

SRQ 3.2 How do customers perceive a difference between plastics recycled in Mongolia and Japan?

The table 4-23 displays how respondents perceived the difference between countries Mongolia and Japan which recycle plastic. 61% of all respondents agreed the difference between the countries. Japan is one of the most popular countries as their waste management, especially plastic recycling. Mongolia is developing country. Her waste management is not good comparing with Japan. Therefore, it is possible to conclude that respondents preferred plastic recycled in Japan to one recycled in Mongolia. Moreover, this difference is apparent.

Table 4-21: Choice * Difference between Recycled Countries Crosstabulation

<table>
<tr><td rowspan="2"></td><td colspan="5">Is there any difference between bottles recycled in Mongolia and Japan?</td><td rowspan="2">Total</td></tr>
<tr><td>Yes</td><td>Maybe</td><td>I don't know</td><td>Maybe not</td><td>No</td></tr>
<tr><td>Total</td><td>31%</td><td>30%</td><td>25%</td><td>7%</td><td>7%</td><td>100%</td></tr>
<tr><td colspan="7"></td></tr>
<tr><td rowspan="2">A new bottle</td><td>34%</td><td>26%</td><td rowspan="2">29%</td><td>4%</td><td>7%</td><td rowspan="2">100%</td></tr>
<tr><td colspan="2">60%</td><td colspan="2">11%</td></tr>
<tr><td rowspan="2">A recycled bottle</td><td>33%</td><td>30%</td><td rowspan="2">20%</td><td>12%</td><td>6%</td><td rowspan="2">100%</td></tr>
<tr><td colspan="2">63%</td><td colspan="2">18%</td></tr>
<tr><td rowspan="2">Both</td><td>27%</td><td>35%</td><td rowspan="2">22%</td><td>8%</td><td>8%</td><td rowspan="2">100%</td></tr>
<tr><td colspan="2">62%</td><td colspan="2">16%</td></tr>
<tr><td rowspan="2">None of them</td><td>31%</td><td>22%</td><td rowspan="2">29%</td><td>12%</td><td>6%</td><td rowspan="2">100%</td></tr>
<tr><td colspan="2">53%</td><td colspan="2">18%</td></tr>
</table>

4.9 Customer demand for recycled plastic bottle

SRQ 3.3 How do customers perceive a plastic bottle recycled by Mongolian companies?

There are 2 features of a plastic bottle recycled by Mongolian companies. The features are “Mongolian” and “Recycled”. An assumption was that respondents tended to answer positively. Because it is a product of their home country.

62% of respondents referred to buy bottled water in the bottle (table 4-24). It was a high percentage. It even reached 75% in the RPR portion. A reason was that it was motivated by supporting home country and preferring a recycled bottle. An influence of home-country support was appeared in the RRP portion. Logically, most RRP would answer not to buy the bottle due to plastic material. However, over half of the respondents referred to buy bottled water in the bottle. It may be explained by their will to support their home country. The highest percentage of respondents who refused to buy the bottle was 30% in a portion of RPN. It shows that the feature, recycling affects negatively.

Table 4-22: Customer attitude towards recycled plastic in Mongolia

<table>
<tr><td rowspan="2"></td><td colspan="5">Would you buy bottled water in packaging made from recycled plastic by Mongolian companies?</td><td rowspan="2">Total</td></tr>
<tr><td>Yes</td><td>Maybe</td><td>I don't know</td><td>Maybe not</td><td>No</td></tr>
<tr><td>Total</td><td>29%</td><td>33%</td><td>17%</td><td>9%</td><td>13%</td><td>100%</td></tr>
<tr><td colspan="7"></td></tr>
<tr><td rowspan="2">A new bottle</td><td>24%</td><td>27%</td><td rowspan="2">20%</td><td>12%</td><td>17%</td><td rowspan="2">100%</td></tr>
<tr><td colspan="2">51%</td><td colspan="2">30%</td></tr>
<tr><td rowspan="2">A recycled bottle</td><td>41%</td><td>34%</td><td rowspan="2">10%</td><td>6%</td><td>9%</td><td rowspan="2">100%</td></tr>
<tr><td colspan="2">75%</td><td colspan="2">15%</td></tr>
<tr><td rowspan="2">Both</td><td>29%</td><td>38%</td><td rowspan="2">16%</td><td>8%</td><td>9%</td><td rowspan="2">100%</td></tr>
<tr><td colspan="2">67%</td><td colspan="2">17%</td></tr>
<tr><td rowspan="2">None of them</td><td>25%</td><td>25%</td><td rowspan="2">22%</td><td>6%</td><td>22%</td><td rowspan="2">100%</td></tr>
<tr><td colspan="2">51%</td><td colspan="2">27%</td></tr>
</table>

Chapter 5
Discussion

Chapter 5 compares the recent results with previous ones. First, it shows findings related with customer preference and attitude. It includes findings regarding factors of the customer preference. At last, there is a part of information types and effects.

5.1 Customer preference and attitude

According to Caroline Orset and her colleagues, people tend to pay more for a recycled PET bottle and biodegradable bio plastic packaging [8]. It shows that people prefer recycled and bio packaging to a PET bottle made from new material. Although the current research did not investigate WTP (willingness to pay) for packaging, there is a finding that respondents preferred a new bottle to a recycled one. It was opposite to the above finding. There is another finding that when customers perceive packaging material, they consider its eco-friendly property [33]. However, in this research, most respondents did not consider the property. They chose a new bottle or did not care the difference (table 4-4). Nicole Koenig-Lewis and her colleagues concluded that environmental concern could change a customer decision [39]. The recent results supported this finding. The information regarding environmental concern had high influence points (+4.89 and -3.91) (table 4-18).

5.2 Factors of customer attitude

There is a finding that freshness is a factor to change customer attitudes towards a recycled bottle [1]. In this research, there was a significant correlation between a customer perception of impurity and a preference for the bottles (table 4-14). Another finding is that women have a higher risk perception. Youngsters tend not to consider the risk [45]. As the current results, women and men chose a new bottle at the nearly same rate (table 4-6). Choosing a new bottle shows a risk perception in this research. Because perceptions of impurity and health impact had a strong correlation with a respondent choice of the bottles (table 4-14). For age classification, the largest number of RPR was belong to the youngest age group (18-25). The oldest respondents tended to choose a new bottle (table 4-5). It was similar with the prior finding. However, there is a finding that elders tend to recycle packaging [34].

5.3 Information effect and diversity

There is a finding that positive information can influence on a consumer attitude of drinking recycled water [29]. In this research, positive-information effects were stronger than the negative ones. Each of the prepared news pieces had a different information content (table 3-8). Therefore, it is possible to compare the news pieces. As the results, the average positive effect was +4.88, whereas the negative one was -4.36 (table 4-21). It shows which one was stronger. Another relevant finding is that there are several factors to influence on a consumer attitude. The factors had not direct relevance with the participants. Sales rates of brand, evaluation, and experts' recommendation are included in the factors [26]. In the current research, most news pieces covered experts' recommendation (table 3-8). As a comparison between the information effects, the information types with the recommendation had a stronger influence on the customer attitude than the ones without it. There is another finding that some outcome beliefs are not changed by information [47]. As the current results, over half of respondents did not change their attitude by the news pieces (table 4-21). People tend not to change their attitude by one piece of information.

Chapter 6
Conclusion

Chapter 6 covers a research conclusion. The conclusion consists of consumer market of bottled water in Mongolia, a customer preference for recycled plastic bottle, information effect on customer attitude and opportunities to penetrate consumer market. The chapter covers research implication and limitation as well.

6.1 General conclusion

A capacity of the consumer market for Mongolian recyclers is massive because nearly all adults are a customer of bottled water in Mongolia. In the market, women buy bottled water little more than men. Bottled water which has the highest demand is a 500ml bottled water. The demand is roughly 4 times as large as ones of the others.

Objective-1: To find out a customer preference and attitudes to a recycled plastic bottle. Nearly half of customers do not care a difference between recycled and new plastic bottles. Customers who prefer a new bottle are over twice as many as ones who prefer a recycled bottle. Customers aged 56 and over choose a new bottle the most. Female customers tend to prefer the bottle as well. Customers at 4th grade or less choose a recycled bottle the most, whereas ones at 8th grade and postgraduate degree tend to prefer a new bottle. Most of customers at the other education levels (12th grade and bachelor's degree) do not consider the difference. The largest number of customers who answered to use recycled plastic product even prefer a new bottle. There is a strong correlation between customer perceptions of impurity and health effect. If customers think that a recycled bottle has impurity, the customers tend to perceive that the bottle affects human health. In this circumstance, the customers prefer a new bottle. Overall, customers who prefer any of new and recycled bottles have a strong attitude to their preference.

Objective-2: To discover information effect on customer attitude.
Over one third of customers change their attitude by information related with recycled plastic. Positive information affects the attitude more than negative one. The most influential positive information is regarding product value of a recycled plastic bottle. The negative one is news which aimed at product outcome.

Objective-3: To explore an opportunity to penetrate the consumer market for Mongolian plastic recyclers.

In Mongolia, two third of customers perceive that there is a difference between water bottles recycled in Mongolia and Japan, especially customers who prefer a new bottle. If Mongolian recyclers can connect their product with Japanese technology or other relevant things with the country, it will be a big advantage to penetrate the market. Customers tend to choose a recycled bottle if the customers perceive to use recycled plastic product. Therefore, an advertisement including the message “for many years, we have been using recycled plastic products …..” will be effective. As for age, younger customers tend to prefer a recycled bottle. It shows that a recycled product for young adults will have a bigger market. On the other hand, the market will shrink if an education level of customers goes down, except for 4th grade and less. Likewise, there is a tendency that a customer preference for the bottle falls off if customers perceive the bottle with impurity and health impact. In contrast, even though one third of customers referred that a water bottle recycled in Mongolia does not match hygiene standards, Mongolian customers tend to choose a bottle recycled by Mongolian companies.

6.2 Implications of findings from the results

Findings of the research are useful to plan marketing strategy for penetration of a consumer market of bottled water in Mongolia. It determined market capacity and segments, and discovered customer behavior, attitude, and preference. Thus, it is possible to illustrate a competition environment of the market. It included several questions for Mongolian plastic recyclers. The recycler can use the findings to design a new product for the consumer market in Mongolia. Furthermore, it will be useful to provide market information for manufacturers which aim to replace new plastic material of a water bottle with recycled plastic and to collaborate with Mongolian recycler companies. The findings brought an opportunity to assess information effects on a customer attitude and thus to evaluate possible risk associated with social network. Likewise, it is possible to recognize types of relevant information with a recycled plastic bottle or other recycled products.

6.3 Limitation in this study

The research did not use real products. 2 bottled water would be suggested and introduced that the waters were in recycled and new plastic bottles. Each respondent would choose one of the waters and the chosen one would be given to the respondent after filling out the questionnaire. In this case, respondents would be more serious when making a decision. Because the respondents would drink the chosen water. There was a company which was requested for using its bottled water for the research. However, the company refused to collaborate.

Another limitation is that the research covered few provinces of Mongolia, especially in west and east regions. Provinces near a capital city were chosen because of financial and time limitation.

The research did not use electric device. In real life, people tend to read news on a smart phone.

Only people aged 18 and above participated in the research. However, there are customers of bottled water under 18 years old.

The research investigated only text news. The other types such as video and audio news were not involved in this research.

There were few real pieces of news in this research. Because real news was insufficient and did not fit for the research requirements.

Bibliography

[1] Adriaan P.W. Kole, Themistoklis Altintzoglou, Rian A.A.M. Schelvis-Smit and Joop B. Luten. The effects of different types of product information on the consumer product evaluation for fresh cod in real life settings. *Food Quality and Preference 20*, 187–194. (2009).

[2] Barra, R., & Sunday , A. *Plastics and the circular economy.* Washington, DC: Plastics and the circular economy. Scientific and Technical Advisory Panel to the Global. (2018).

[3] Britannica, E. *Mongolia*. Retrieved from Encyclopædia Britannica: https://www.britannica.com/place/Mongolia#/media/1/389335/61518. (2020, 06 30).

[4] Cambrdige. (n.d). *effect*. Retrieved from Cambridge dictionary: https://dictionary.cambridge.org/dictionary/english/effect

[5] Cambridge. (n.d). *customer*. Retrieved from Cambridge dictionary: https://dictionary.cambridge.org/dictionary/english/customer

[6] Cambridge. (n.d). *information*. Retrieved from Cambridge dictionary: https://dictionary.cambridge.org/dictionary/english/information

[7] Cambridge. (n.d). *preference*. Retrieved from Cambridge dictionary: https://dictionary.cambridge.org/dictionary/english/preference

[8] Caroline Orset, Nicolas Barret and Aurélien Lemaire. How consumers of plastic water bottles are responding to environmental policies? *Waste Management 61*, 13-27. (2017).

[9] Daniela Baum, Martin Spann, Johann Füller and Torsten Pedit. Social Media Campaigns For New Product. *the 21st European Conference on Information Systems* (pp. 1-12). AIS Electronic Library. (2013).

[10] David Azoulay, Priscilla Villa, Yvette, Miriam Gordon, Kathryn Miller, Kristen Thompson and Amanda Kistler . *Plastic and Health - the hidden costs of a plastic planet.* Washington DC: Center for international environmental law. (2019).

[11] Dictionary. (n.d). *customer*. Retrieved from Dictionary.com: https://www.dictionary.com/browse/customer#

[12] Dictionary. (n.d). *effect*. Retrieved from dictionary.com: https://www.dictionary.com/browse/effect?s=t

[13] Dictionary. (n.d). *information*. Retrieved from Dictionary.com: https://www.dictionary.com/browse/information?s=t

[14] Dictionary. (n.d). *preference*. Retrieved from dictionary.com: https://www.dictionary.com/browse/preference?s=t

[15] Franco Mawad, Marcela Trías, Ana Giménez, Alejandro Maiche and Gastón Ares . Influence of cognitive style on information processingand selection of yogurt labels: Insights from an eye-tracking study. *Food Research International 74*, 1-9. (2015).

[16] Gheorghe Orzan, Anca Francisca Cruceru, Cristina Teodora Bălăceanu and Raluca-Giorgiana Chivu . Consumers' Behavior Concerning Sustainable Packaging: An Exploratory Study on Romanian Consumers. *Sustainability*, 1787. (2018).

[17] Gombojav Delgermaa and Toru Matsumoto. Estimating household waste flow to improve the waste management system in Ulaanbaatar, Mongolia. *土木学会論文集 G（環境）vol.73, no.5*, 201-209. (2017).

[18] Gonzalez, C. Decision-Making: A Cognitive Science Perspective. In S. F. Chipman, *The Oxford Handbook of Cognitive Science* (pp. 135-280). Oxford University Press. (2014).

[19] Graca Martinho, Ana Pires, Goncalo Portela and Miguel Fonseca. Factors affecting consumers' choices concerning sustainable packaging during product purchase and recycling. *Resources, Conservation and Recycling 103*, 58-68. (2015).

[20] Hannah Ritchie and Max Roser. *Plastic pollution.* Retrieved from ourworldindata.org/: https://ourworldindata.org/plastic-pollution. (2018, September).

[21] Herders, please do not use plastic utensils. Retrieved from MNB Монголын мэдээ: https://www.facebook.com/mnbmongoliinmedee/videos/2038967886184960/?v=2038967886184960. (2019, february 01).

[22] J.Rhodes, C. Plastic pollution and potential solutions. *Sage journal*, 207-260. (2018).

[23] Jeannette M. Garcia and Megan L. Robertson. The future of plastic recycling. *Science 358*, 870-872. (2017).

[24] Jefferson Hopewell, Robert Dvorak and Edward Kosior. Plastics recycling: challenges and. *Phil. Trans. R. Soc. B*, 2115–2126. (2009).

[25] Jeffrey L. Sturchio, Arthur P. Molella, Jon Eklund, Robert, Jeffrey L, James J. Bohning, Suzanne Daly, Lawrence B. *The Bakelizer.* Washington DC: The American Chemical Society. (1993).

[26] Jie Chen, Lefa Teng, Ying Yu and Xueer Yu. The effect of online information sources on purchase intentions between consumers with high and low susceptibility to informational influence. *Journal of business research 69*, 467-475. (2016).

[27] Joonas Rokka and Liisa Uusitalo. Preference for green packaging in consumer product choices – Do consumers care? *International Journal of Consumer Studies 32*, 516–525. (2008).

[28] Keiko Yamaguchi and Kenji Takeuchi. Consumer preferences for reduced packaging under economic. *Waste Management 48*, 540–547. (2016).

[29] Kelly S. Fielding and Anne H. Roiko. Providing information promotes greater public support for potable recycled water. *Water research 61*, 86-96. (2014).

[30] Kimberly Klaiman, David L. Ortega and Cloe Garnache. Perceived barriers to food packaging recycling: Evidence from a choice experiment of US consumers. *Food Control 73*, 291-299. (2017).

[31] Kimberly Klaiman, David L. Ortega and Cloé Garnache. Consumer preferences and demand for packaging material and recyclability. *Resources, Conservation and Recycling 115*, 1-8. (2016).

[32] Lau, R. R. Models of decision-making. In L. H. D. O. Sears, *Oxford handbook of political psychology* (pp. 19–59). Oxford University Press. (2003).

[33] Lise Magnier and Jan Schoormans. How Do Packaging Material, Colour and Environmental Claim Influence Package, Brand and Product Evaluations? *Packaging technology and science 30*, 735–751. (2017).

[34] Lyndsey Scott and Debbie Vigar-Ellis. Consumer understanding, perceptions and behaviours with regard to environmentally friendly packaging in a developing nation. *International Journal of Consumer Studies 38*, 642–649. (2014).

[35] Macmillandictionary. (n.d). *customer*. Retrieved from macmillandictionary.com: https://www.macmillandictionary.com/dictionary/british/customer

[36] Macmillandictionary. (n.d). *effect*. Retrieved from macmillandictionary.com: https://www.macmillandictionary.com/dictionary/british/effect_1

[37] Macmillandictionary. (n.d). *information*. Retrieved from macmillandictionary.com: https://www.macmillandictionary.com/dictionary/british/information

[38] Macmillandictionary. (n.d). *preference*. Retrieved from macmillandictionary.com: https://www.macmillandictionary.com/dictionary/british/preference

[39] Nicole Koenig-Lewis, Adrian Palmer, Janine Dermody and Andreas Urbye. Consumers' evaluations of ecological packaging e Rational and. *Journal of Environmental Psychology 37*, 94-105. (2014).

[40] Nigel D. Steenis, Erica van Herpen, Ivo A. van der Lans, Tom N. Ligthart and Hans C.M. van Trijp. Consumer response to packaging design: The role of packaging materials and graphics in sustainability perceptions and product evaluations. *Journal of Cleaner Production 162*, 286-298. (2017).

[41] Ritchie, H., & Roser, M. *Plastic Pollution*. Retrieved from Our world in data: https://ourworldindata.org/plastic-pollution. (2018, 09 01).

[42] Riyad. Moharam, Maher Ali. Al. Maqtari. The Impact of Plastic Bags on the Environment: A field Survey of the City Of Sana'a And The Surrounding Areas, Yemen. *International Journal of Engineering Research and Reviews* , 61-69. (2014).

[43] Rod D. Roscoe, Carola Grebitus, Joseph O'Brian, Adam C. Johnson and Irfan Kula. Online information search and decision making: Effects of web search stance. *Computers in Human Behavior 56*, 103-118. (2016).

[44] Roger D. Blackwell, Paul W.Miniard and James F. Engel. *Consumer behavior.* Mason: Thomson South-Western. (2006).

[45] Seol-A Kwon, Hyun-Jung Yoo and Eugene Song. Korean Consumers' Recognition of Risks Depending on the Provision of Safety Information for Chemical Products. *International journal of Environmental Research and Public Health*, 1207. (2020).

[46] Solid waste management. Retrieved from The world bank: https://www.worldbank.org/en/topic/urbandevelopment/brief/solid-waste-management. (2019, 10 17).

[47] Tom Meyvis and Chris Janiszewski. Consumers' Beliefs about Product Benefits: The Effect of Obviously Irrelevant Product Information. *Journal of Consumer Research Vol. 28*, 618-635. (2002).

[48] Tourism, T. M. *Solid waste management in Mongolia*. Retrieved from United Nations Centre for Regional Development:

https://www.uncrd.or.jp/content/documents/6133Country-G-2-Mongolia.pdf. (2018, April 12).

[49] Undrakh-Od Baatar and Jana Zilkova CCR. *Plastic recycling in Mongolia.* Ulaanbaatar. (2015).

[50] Walter B. Wentz and Gerald I. Eyrich. *Marketring - theory and application.* San Francisco: Harcourt, Brace & World, Inc. (1970).

[51] Yingxu Wang; Guenther Ruhe. The Cognitive Process of Decision. *Int'l Journal of Cognitive Informatics and Natural Intelligence*, 73-85. (2007).

[52] Yuexiao, Z. Definition and sciences of information. *lnformorron Processing & Managemenl*, 479-491. (1988).

Appendix

Appendix 1: Demography - Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18-25	353	38.2	38.2	38.2
	26-35	241	26.1	26.1	64.3
	36-45	171	18.5	18.5	82.8
	46-55	105	11.4	11.4	94.2
	56 and above	54	5.8	5.8	100.0
	Total	924	99.9	100.0	
Missing	System	1	.1		
Total		925	100.0		

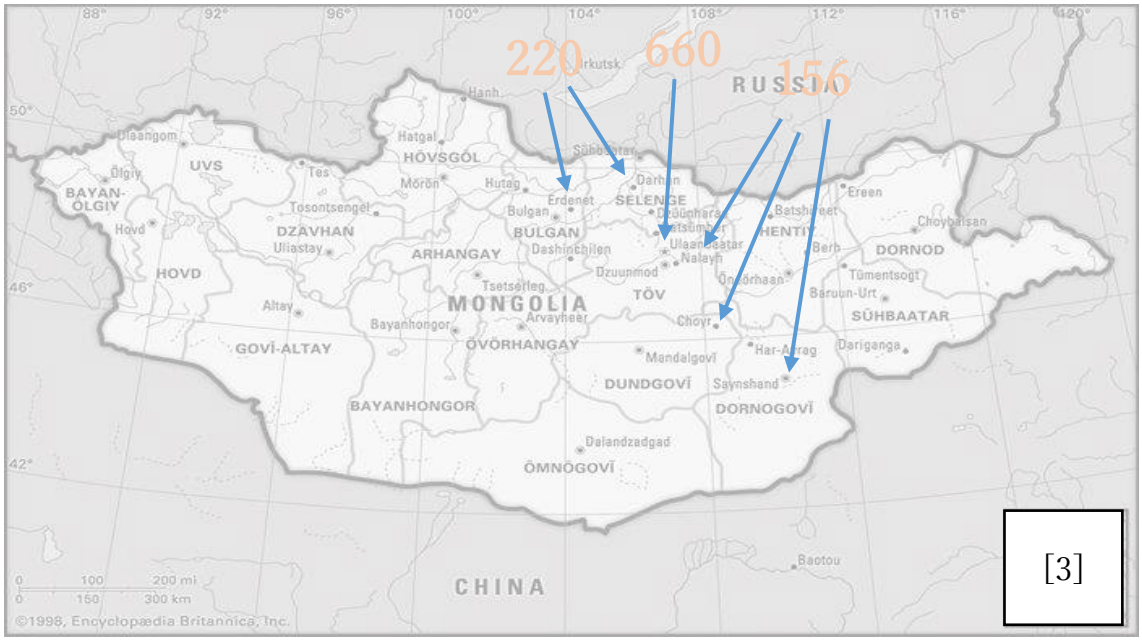
Appendix 2: Demography – Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Man	356	38.5	38.5	38.5
	Woman	569	61.5	61.5	100.0

Appendix 3: Demography - Education

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	4th grade or less	35	3.8	3.8	3.8
	8th grade	257	27.8	27.8	31.6
	12th grade	179	19.4	19.4	50.9
	bachelor's degree	384	41.5	41.5	92.4
	post-graduate degree	70	7.6	7.6	100.0
	Total	925	100.0	100.0	

Appendix 4: Geographical classification



Appendix 5: Questionnaire distribution

Region	District		Questionnaire	Info-types
West	1	Erdenet	110	10
	2	Darkhan	110	10
	Total		**220**	**10**
Middle	1	Han Uul	110	10
	2	Chingeltei	110	10
	3	Sukhbaatar	110	10
	4	Songino Khairhan	110	10
	5	Bayangol	110	10
	6	Bayanzurh	110	10
	Total		**660**	**10**
East	1	Baganuur	110	10
	2	Gobisumber	55	5
	3	Dornogobi	55	5
	Total		**220**	**10**
Mongolia	**Total**		**1100**	**10**

Appendix 6: Questionnaire

CUSTOMER SURVEY OF BOTTLED WATER

This survey is to research customers' attitude to packaging of bottled water and information influence on the attitude.

1. Do you buy bottled water? /if you answer "no", please answer from question 6. /

a. Yes b. No

2. Which size do you usually buy?

a. 330ml b. 500ml c. 1.5 Liter d. 5 Liter e. 20 Liter

3. When do you buy a bottled water?

a. trip or travel b. sport or exercise

c. walking or being in a car on a hot day d. attending conference or event

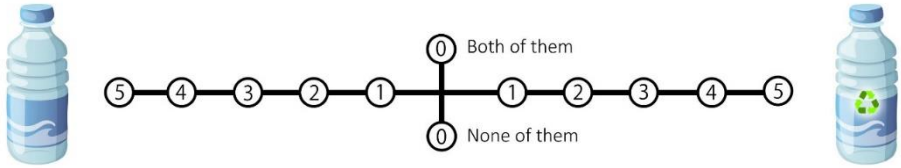
e. others: …….

4. Which bottled water do you buy when there are ones made from recycled and virgin plastics on a bar?

a. Bottled water in a virgin-plastic bottle b. Bottled water in a recycled-plastic bottle

c. Both d. None of them

5. Please evaluate your choice. /from 1- "not sure" to 5- "certain"/



6. Does a virgin-plastic bottle contain impurity? a. Yes b. No c. Maybe d. Maybe not f. I don't know

7. Does a recycled-plastic bottle contain impurity? a. Yes b. No c. Maybe d. Maybe not f. I don't know

8. Does a recycled plastic bottle impact on health? a. Yes b. No c. Maybe d. Maybe not f. I don't know

9. Have you ever used recycled plastic product? a. Yes b. No c. Maybe d. Maybe not f. I don't know

10. Can plastic recycled in Mongolia match hygiene standards?

a. Yes b. No c. Maybe d. Maybe not f. I don't know

11. Is there any difference between bottles recycled in Mongolia and Japan?

a. Yes b. No c. Maybe d. Maybe not f. I don't know

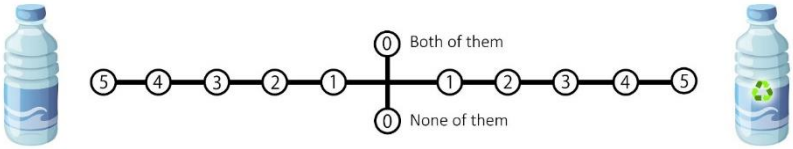
12. Would you buy bottled water in packaging made from recycled plastic by Mongolian companies?

a. Yes b. No c. Maybe d. Maybe not f. I don't know

13. Please read the follow information

Note: We cannot prove that this news is true due to it is from internet

14. Please evaluate your choice again? /from 1- "not sure" to 5- "certain"/



What is your age group?

a. 18-25 b. 26-35 c. 36-45 d. 46-55 e. 56 and over

Are you a man or a woman?

a. Man b. Woman

Education:

a. 4th grade or less b. 8th grade c. 12th grade

d. bachelor's degree e. post-graduate degree

Province:

……..

The above news is not real. It is just written for the research

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