Investigating Factors that Affect Individual Quality of Life by Participating in Pro- Environmental Behavior: Implications on Policies and Management

By

SEOL, Jihun

THESIS

Submitted to

KDI School of Public Policy and Management

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ABSTRACT

Purpose of the study: This study explores factors that affect individual quality of life by participating in pro-environmental behavior. Many countries around the world are creating policies to promote pro-environmental to respond to climate change. These policies can work effectively by understanding how individual quality of life can be improved and by identifying the factors that make individuals participate in pro-environmental behavior. **Research Question**: This study conduct research based on research questions: i) which factors such as economic benefits, social responsibility, environmental consciousness, sustainability, happiness, health, and environmental commitment affect individual quality of life. ii) how individual quality of life by participating in pro-environmental behavior affects attitude toward the pro-environmental behavior; and iii) how individual quality of life affects individual intention to participate in pro-environmental behavior. **Methodology**: This study conducted an anonymous survey through online channel and tried to apply factor and regression analyses and ANOVA to test hypotheses. The online survey was conducted anonymously and voluntarily, and all response records were kept strictly confidential. **Major findings**: Economic benefits, sustainability, and happiness factors significantly affect quality of life and quality of life affects attitude and intention to participate. **Implications**: The findings of the study provide implications and suggestion on policies and management to promote individual pro-environmental behavior.

Keywords: Pro-Environmental Behavior, Quality of Life, Satisfaction, Intention to Participate, Policy

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I. Introduction

As the importance of climate change has emerged and human activity have been influencing climate change, global efforts to solve global warming and environmental problems are continuously progressing (Ramli et al., 2021). According to Intergovernmental Panel on Climate Change (IPCC) (2021), the global average temperature is expected to rise by 1.5 degrees Celsius compared to pre-industrial temperature levels between 2001 and 2040, which is 10 years earlier than the result of a study three years ago, and human activity appears to be one of the main causes of this increase in global average temperature.

The global efforts to respond to climate change and reduce human impact on global average temperature began with the Stockholm Conference in 1972 (UN, n.d). Later, in 1997, the Kyoto Protocol, which stipulated greenhouse gas reduction targets in developed countries, was implemented (UNFCCC, 1997). In 2016, through the Paris Agreement, not only developed countries but all 195 countries reached a universal agreement to respond to climate change. (UNFCCC, 2016).

Since the adoption of the Paris Agreement (2016) to respond to the environmental and climate crisis, discussions on carbon neutrality have spread worldwide (UNFCCC, 2016). The United States, European Union (EU), and Canada have been accelerating movements to achieve carbon neutrality, such as raising the national greenhouse gas reduction target by 2030 to achieve carbon neutrality (UNFCCC, 2016). In 2020, Korea also declared its 2050 carbon-neutral goal and in 2021, by enacting the Framework Act on Low Carbon, Green Growth to respond to the climate and environmental crisis, it has prepared a legal and institutional basis for promoting carbon neutrality (KMA, 2021).

However, since environmental problems have the character of a social dilemma in which the individual's pursuit of profit results in a socially undesirable situation and the government's own greenhouse gas reduction efforts alone cannot effectively respond to climate change (Hyun & Choi, 2023; Guagnano et al., 1995), governments and communities around the world are implementing various methods to encourage people's voluntary pro-environmental behavior (Shin & Lee, 2016; UNEP, 2012; OECD, 2008).

The Japanese government has been implementing an eco-point system that returns 5% of the purchase price through government budget support to consumers who purchase eco-friendly home appliances with low carbon emissions (KITA, 2009). The French government provided incentives for the purchase of vehicles with low carbon dioxide emissions and imposes a tax on the purchase of vehicles with high carbon dioxide emission by introducing the Bonus-Malus System (IEA, 2021). US President Joe Biden signed The Inflation Reduction Act in August 2022, and based on the bill, consumers who purchase certain types of electric vehicles are provided with an annual federal tax credit of up to $7,500 (Bloomberg, 2023). In Amsterdam, the Netherlands, 'the wasted project' is being implemented through voluntary cooperation between the local government and citizens, and when citizens bring plastic waste to the 'wasted lab', a local hub facility that collects plastic, in return, citizens are paid coins that can be used like real money in the region (Yoon, 2018).

In 2012, the Korean government is also establishing policies to promote pro-environmental consumption through the Act on The Promotion of Green Products (KME, 2012). Furthermore, the Korean government is implementing measures to promote pro-environmental behaviors including eco-money, green cards, and carbon points to raise awareness of individual citizens on

greenhouse gas reduction and low-carbon, green growth, and to expand their voluntary participation (KME, 2022).

According to the Korean Environment Institute (KEI) (2021), it seems that the level of environmental awareness of public is increasing by the Korean government's continuous efforts to encourage pro-environmental behavior, but voluntary participation in pro-environmental behavior for environmental protection seems to be sluggish. Based on a survey of by KEI (2021) related to environmental awareness of public and intention to participate in pro-environmental behavior, 74.2% of respondents said that they were interested in environmental issues in 2018 (This is an increase of 19.8% compared to 2017), while the percentage of respondents who are willing to take inconvenience in life to participate in environmentally friendly behavior has been decreased (KEI, 2021).

Li et al. (2019) insisted that many existing studies have tried to explore and investigate predictive factors that affect the practice and intention of individual pro-environmental behavior. In many studies, various variables such as demographic variables (Whitmarsh & O'Neillm, 2010; Clark et al, 2003; Robert, 1996), environmental awareness (Wang et al., 2012), and attitudes toward pro-environmental behavior (Dolnicar & Leisch, 2008; Bamberg & Möser, 2007), were considered as major predictive factors that significantly affect individual pro-environmental behavior.

Therefore, this study try to explore factors that affect individual quality of life by participating in pro-environmental behavior in S. Korea. This study also derive implications for what factors the Korean government and company should consider to enhance citizen and consumers' pro-environmental behavior. For this goal, this study conducts research based on

research questions: i) which factors such as economic benefits, social responsibility, environmental consciousness, sustainability, happiness, health, and environmental commitment affect individual quality of life by participating in pro-environmental behavior. ii) how individual quality of life affects actual individual satisfaction for pro-environmental behavior; and iii) how individual quality of life and satisfaction affect intention to participate in pro-environmental behavior.

II. Literature Review

2.1 Pro-Environmental Behavior

2.1.1 Definition and Development

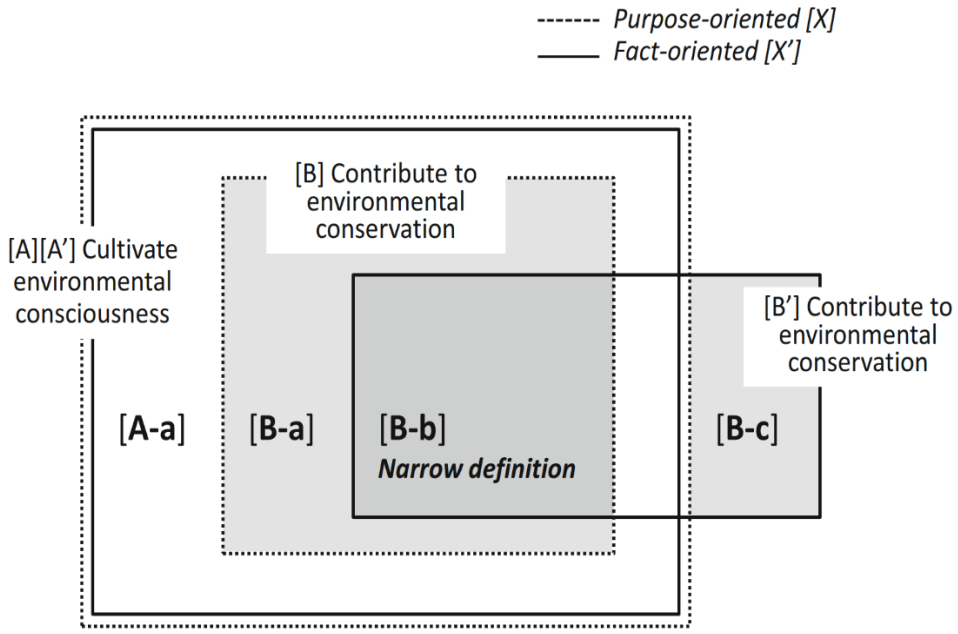
In many studies, pro-environmental behavior generally means all individual activities that voluntarily or consciously practice to contribute to environmental protection (Kollmuss & Agyeman, 2002; Steg & Vlek, 2009). In a broader sense, pro-environmental refers to activities that minimize their negative impact on the surrounding nature (Kim & Moon, 2013; Lee & Khan, 2020). Kurisu (2015) argues that the definition of pro-environmental behavior can be categorized into two categories depending on the purpose of behavior: *conversion of environment and cultivation of environmental consistency*. Kurisu (2015) also indicate that pro-environmental behavior has been used in various terms historically. Table 1 summarizes various terms of pro-environmental behavior and Figure 1 describes two categories of pro-environmental behavior.

Table1. Alternative terms for pro-environmental behavior (Kurisu, 2015)

Term	Alternative terms
Pro-Environmental Behavior	・Proenvironmental behavior ・Environmental behavior ・Ecological behavior ・Environmentally responsible behavior ・Responsible environmental behavior

	・Environment-friendly behavior ・Environmentally significant behavior ・Environmentally related behavior

Figure 1. Two Categories of Definition of Pro-Environmental Behavior (Kurisu, 2015)



As the importance of climate change has emerged, interest in study about pro-environmental behavior has been increased (Stern, 2000). From the mid-1960s, the concept and meaning of pro-environmental behavior has been addressed and discussed (Craik, 1973). Various academic fields also try to investigate the concept of pro-environmental behavior and scientific research methodologies to investigate pro-environmental behavior began to expand in the 1970s (Borden, 1977). Throughout 1980s and 1990s, many studies have shown great interest in what independent variables can predict pro-environmental behavior (Arbutnot, 1977).

At first, participation in pro-environmental behavior resulted from differences in socio-demographic factors attracted much research attention (Botetzagias et al., 2015). For example,

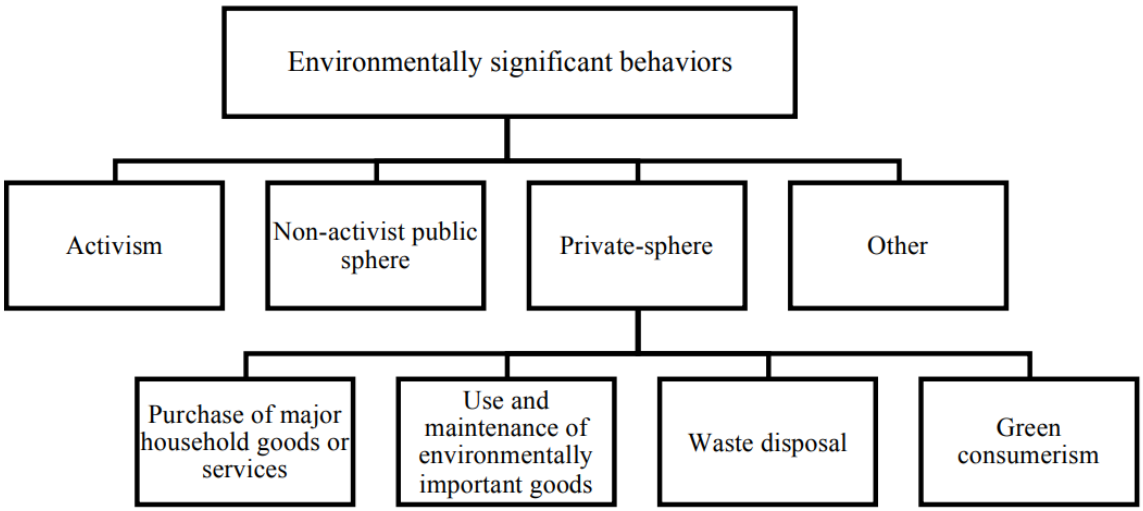
gender, education, income, marriage, and urban residence act as antecedents of intention to participate in pro-environmental behavior (López-Mosquera et al., 2015). However, it is also true that demographic differences may not always be effective independent variable for pro-environmental behavior. It has been argued that the attitude that individuals have toward pro-environmental behavior is more important as antecedents of pro-environmental behavior than demographic difference (De Leeuw et al., 2015). For example, if individuals have good attitude toward pro-environmental behavior, it is more possible for them to perceive natural environment as a necessary resources to human beings (Milfont & Duckitt, 2010). There is also some evidence that pro-environmental attitudes are positively and significantly correlated with pro-environmental behaviors. Additionally, political interest and social capital (Torgler & García-Valiñas, 2005), habits (Webb et al., 2009), moral norms (Lizin et al., 2017), previous experience (Perrin, 2001), concerns for the future (Martinho et al., 2015), and other psychological variables have been studied. However, many studies have shown that individual attitudes are not always deeply correlated with pro-environmental behavior, and pro-environmental behavior is rather more affected by external situations in which individuals are faced. (Davies et al., 2002; Lim et al., 2015; Missimer et al., 2017).

2.1.2 Types and Categories

Stern (2000) insisted that pro-environmental behavior can cluster together and can be divided into four subtypes: purchasing environmentally-conscious products (*green consumerism*), maintaining and repairing important household products that affect the environment (*use and maintenance of environmentally important goods*), the act of throwing away waste in consideration

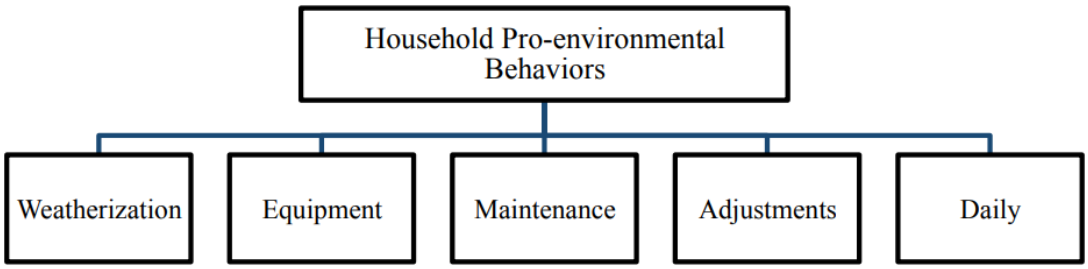
of the environment (*waste disposal*), and buying major household goods or services in consideration of the environment (*purchase of major household goods or services*).

Figure 2. Classification of Pro-Environmental Behavior (Stern, 2000)



Dietz et al. (2009) try to classify household activities into five categories in terms of pro-environmental behavior: the act of improving energy efficiency by renovating buildings (*weatherization)*, the act of considering the environment in everyday life (*daily actions*), using energy-efficient equipment (*energy-efficient equipment*), *maintenance, and adjustments*.

Figure 3. Categorization of Household pro-environmental behavior (Dietz et al., 2009)



The United Nations (2021) suggested a list of pro-environmental behavior that can be practiced in everyday life for the Sustainable Development Goals (SDGs) in four categories: *things you can do from your couch, things you can do at home, things you can do outside your house, things you can do at work.*

Table2. A List of Pro-Environmental Behavior for the Sustainable Development Goals (UN, 2021)

Level	Pro-Environmental Behavior Lists
Things you can do from your couch	・Pull the electrical cord completely ・Change Paper Bill to Mobile Bill ・Supporting the Paris Agreement, pledging to live a carbon-neutral life ・Turn off the lights ・Investigate companies that do not practice sustainable management or harm the environment and use their products ・Become a Keyboard Warrior ・Calculating Carbon Footprints and Buying Climate Credit From Climate Neutral
Things you can do at home	・Washing when it's full, not using a dryer ・Pull the electrical cord completely ・Reduce shower time ・Eating Less Meat, Poultry, and Fish ・the use of food waste as fertilizer ・Recycling Paper, Plastic, Glass, Aluminum ・Do not use over-packaged products ・Blocking air leaks in windows and doors ・Replacing old appliances with high-efficiency energy products

Things you can do outside your house	· Using a surrounding store · Sustainable Seafood Shopping · Bike, walk, and use public transportation · Using Multiple Containers · Taking a multi-use bag when shopping · Buying Used Products · Donating unused items
Things you can do at work	· Giving fruits or snacks to people in need · Identifying rights in the workplace, fighting inequality · Being a mentor to young employees · Declaring support for equal work and equal pay · Ensuring that your company's heating and cooling system is efficient · To go to work by bicycle, walking, or public transportation · Create a week with no impact at work

The Seoul Institute (2021) presented a list of pro-environmental behavior on resource circulation, eco-friendly transportation, climate behavior and other pro-environmental practices, covering pro-environmental behavior that can be practiced in Korea. The Seoul Institute (2021) also selected five pro-environmental behavior that can be implemented first among 32 pro-environmental behavior, and specific explanations and examples are presented to enhance citizens' understanding.

Table3. A List of Pro-environmental behavior (The Seoul Institute, 2021)

Level	Pro-environmental behavior Lists
Eco-friendly transportation	· Using public transportation · Walking for a short distance · Riding a bicycle for a short distance · Buying an eco-friendly car · Practicing Eco-Driving · Check the tire pressure periodically
Resource Circulation	· Use reusable product sales stores or sharing markets · Donating unused items · Repairing and Sharing goods · Use bamboo toothbrushes, stainless steel straws, etc. · Upcycle or DIY items directly · Using reusable containers (shopping basket, multi-use cup, etc.) · Using Mobile Billing · Reducing Food Waste

	・Buying Plastic-Free Products ・Using bulk stores or traditional markets ・Fertilization of food waste ・Use of products from companies with excellent sustainable management ・Organizing a Zero Waste Community with Your Neighbors ・Promote Zero Waste Life (blogs, YouTube, etc.) ・Zero Waste Experience Sharing with Neighbors ・Participating in Zero Waste Events ・Donating for eco-friendly practice ・Return Disposable Packaging to Packaging Collection Point ・Purchase recycled products ・Active waste separation and discharge
Climate behavior and Other pro-environmental behavior	・Using a low-carbon diet once a week ・Using a local store ・Calculating Carbon Footprints and Buying Climate Credits ・Participating in tree planting activities ・Planting trees ・Awareness of protection of forests, wetlands, etc. ・Supporting the Paris Agreement and pledging to live a carbon-neutral life

III. Hypotheses Development

This study tried to explore factors that affect individual quality of life by participating in pro-environmental behavior. Suggested factors are economic benefits, social responsibility, environmental consciousness, sustainability, happiness, health, and environmental commitment. In the research, these factors were used to test hypotheses as an independent variables. This study was conducted on actual and potential pro-environmental behavior participants. Hypothesis testing examines which factors related to pro-environmental behavior influence individual quality of life by participating in pro-environmental behavior and determines how quality of life affect attitude and intention to participate in pro-environmental behavior.

3.1 Effects of Economic Factor on Quality of Life

Turaga et al. (2010) insisted that all individuals try to maximize their utility. By the way, public interests and individual utility may conflict in the process of protecting the environment

(Karp, 1996). If individual utility takes precedence over public interest and individual will not participate in pro-environmental behavior, individual utility can be an important factor in explaining individual behavior (Triandis, 1990). Economically, if the effort involved in pro-environmental behavior and the sacrifice of individual utility are too large, the possibility of individuals participating in pro-environmental is relatively low, no matter how highly conscious they are of the environment (Diekmann and Preisendorfer, 1998). Economic sanctions and compensation arising from the legal requirement of garbage separation are highly correlated with individual participation in garbage separation and the quality of the public transportation network and the size of the cost required for personal car use have been found to have a significant influence on individuals' intention to use public transportation or not (Brand,1997). However, sometimes financial rewards are not always effective in the long-term because because people can stop acting at any time when time passes or financial benefits disappear. (Schwartz et al., 2015). Therefore, this study hypothesized the effects of economic factor on individual quality of life by participating in pro-environmental behavior.

H1: Perceived economic factor affects individual quality of life by participating in pro-environmental behavior.

3.2 Effects of Social Factor on Quality of Life

Social support is resources that an individual can gain from positive interpersonal relationships, which can affect individual behavior, and individual participation in pro-environmental behavior is also affected by social support (i.e., praise or recognition) received from acquaintances in a socially formed atmosphere (Song, 2020). Lamberton and Rose (2012) discovers consumers feel satisfied when social value is considered in the process of purchasing

products and services. Lamberton and Rose (2012) also found that people tends to purchase products and services when their consumption is approved by friends or family. In addition, customers consider social trends when shopping to strengthen their social identity (Moeller & Wittkowski, 2010). The social consequences of behavior, responsibility for it, and the degree of individual perception of social responsibility are also important determinants of the decision to participate in behavior (Garling et al, 2003). Therefore, this study hypothesized the effects of social factor on individual quality of life by participating in pro-environmental behavior.

H2: Perceived social factor affects individual quality of life by participating in pro-environmental behavior.

3.3 Effects of Environmental Consciousness on Quality of Life

The definition of environmental consciousness is an individual's willingness to recognize and solve environmental problems, and tendency to perceive nature as essential to mankind (Lin & Chang, 2012). This environmental consciousness can be classified into environmental consciousness, which means an individual's attitude to various environmental issues such as environmental pollution, natural resource development (Paul et al., 2016), and environmental knowledge, which means direct and indirect knowledge of the natural environment and major ecosystem (Kim et al., 2018). Many studies have concluded that environmental knowledge and environmental consciousness are interdependent factors, and environmental knowledge determines an individual's environmental consciousness, and that the level of environmental consciousness again affects pro-environmental behavior (Cottrell, 2003). However, it seems that environmental consciousness does not necessarily lead to pro-environmental behavior. Schultz et al. (1995) found that there was no significant statistical correlation in four of the nine preceding

studies that studied the correlation between environmental consciousness and recycling behavior. Thus, this study hypothesized the effects of environmental consciousness on individual quality of life by participating in pro-environmental behavior.

H3: Perceived environmental consciousness affects individual quality of life by participating in pro-environmental behavior.

3.4 Effects of Sustainability on Quality of Life

Sustainability refers to the concept of not compromising the rights and resources of future generations to meet the needs of current generations (Brundtland, 1987). The concept of sustainability has been addressed over the past 20 years as interest in sustainability has been increased and many regulations require companies to disclose their sustainability data to multi-stakeholders (Garbie, 2015). Nevertheless, it is also true that the level of awareness of sustainability held by individuals does not directly lead to changes in individual behavior (Ro et al., 2017). There may be various reasons why the level of awareness of sustainability does not lead to behavioral changes, but the main reason may be that sustainable issues often do not immediately affect people's lives (Kollmuss & Agyeman, 2002). However, Rustam et al. (2020) indicate that companies' sustainability disclosure can be the driving force behind green consumption practices, which might promote customer's green choices. In the light of sustainability, promoting human well-being requires considering people's overall relationship to their environment (Moser, 2009). Therefore, this study hypothesized the effects of sustainability on individual quality of life by participating in pro-environmental behavior.

H4: Perceived sustainability affects individual quality of life by participating in pro-environmental behavior.

3.5 Effects of Environmental Commitment on Quality of Life

Immersion is defined as the optimal psychological state that appears when concentrating on an activity, maintaining a continuous relationship emotionally or cognitively with a specific object or group during action (Shin, 2010). Environmental commitment is a concept developed by applying the concept of immersion defined based on the relationship between individual and environment and the concept of psychological attachment to and long-term orientation toward the natural world (Davis et al., 2009). That is, environmental commitment means nature and human beings are interdependent, then better human life can be guaranteed, only when nature is preserved (Lee & Hahn, 2009). Environmental commitment partially explains farmers' pro-environmental behavior in the case of farmers who work long hours in nature (Gosling & Williams, 2010), and those with positive support for eco-friendly systems, plans, or policies have a positive attitude toward the natural environment (Coy et al., 2013). Further, environmental commitment in the process of purchasing products or services was found to be an important variable that made consumers consider the environment (Yu & Lee, 2014). Therefore, this study hypothesized the effects of environmental commitment on individual quality of life by participating in pro-environmental behavior.

H5: Perceived environmental commitment affects individual quality of life by participating in pro-environmental behavior.

3.6 Effects of Happiness on Quality of Life

As the need for a multidimensional measure of happiness is raised and addressed (Sirgy, 2012), many studies are increasing to explore and investigate the importance of nature to measure individual happiness, along with external values such as money and health, and internal

factors such as psychological well-being and social well-being (Zelenski & Nisbet, 2014). In addition to economic indicators, nature-related indicators such as pollution levels are also included in the happiness index reported by the United Nations (UN, 2023). As climate change and environmental crisis (i.e. global warming) is drawing attention as one of the major crises around the world (Steg et al, 2014), interest in solving environmental problems through pro-environmental behavior, improving social sustainability, and the relationship between sustainability and human happiness is increasing (Nisbet & Zelenski, 2011; Guéguen, & Stefan, 2014; Zelenski et al., 2015). Kim et al. (2017) conducted an in-depth interview with a total of 15 participants who are interested in food and understand eco-friendly food, and found that participants stated about not only the nutrition and taste of food but also the health and happiness of themselves with their families and the natural environment protection (Kim et al., 2017). Based on studies dealing with nature and human happiness mentioned above, this study assumes that humans feel happiness in nature and that people who feel more happiness from nature are more likely to participate in pro environmental behavior.

H6: Perceived happiness affects individual quality of life by participating in pro-environmental behavior.

3.7 Effects of Health on Quality of Life

Health consciousness means a psychological state where an individual is concerned about his/her health condition (Castellini et al., 2023), and regarded as an egoistic tendency that is directly related to individual benefits and can act as a significant factor that affects individual behavior (Magnusson et al., 2003). Also, Individual health-related behavior, which can be arise from health consciousness, is the most significant factors that affect both climate change and

chronic disease, and health consciousness was found to have a significant effect on individual participation in the pro-environmental behavior (Castellini et al., 2023). Consumers with high health consciousness show a positive attitude toward green products and use eco-friendly agricultural products more frequently (Kim et al., 2008). However, Tarkiainen & Sundqvist (2005) refuted the claim that attitude toward health could be deeply related to the tendency to purchase eco-friendly agricultural products, and Lim et al. (2013) insisted that health factor has no significant predictive effect on the repurchase of eco-friendly agricultural products. Therefore, this study hypothesized the effects of health on individual quality of life by participating in pro-environmental behavior.

H7: Perceived health affects individual quality of life by participating in pro-environmental behavior.

3.8 Effects of Quality of Life on Attitude and Intention to Participate

Arnould et al. (2001) defined attitude as individual evaluation of an object and factor. As it turned out that attitude deeply influence the way an individual behaves and their inner intentions, various studies have become interested in individual attitude. (Ajzen, & Fishbein, 1980; Blackwell, Miniard, & Engel, 2006). Consumer attitude toward product and service have a positive impact on purchase intentions (Oliver, 1976). Fishbein & Ajzen (1975) insisted that positive attitude is deeply correlated to increasing purchase intentions base on Fishbein model. Individual behavioral intentions can be influenced by perceived positive attitudes, and individuals may have consciousness that make individual perform specific behaviors (Brezavscek, Sparl, & Znidarsic, 2017). Therefore, this study hypothesized the effects of quality of life by participating in pro-

environmental behavior affects attitude toward pro-environmental behavior and intetion to participate in pro-environmental behavior.

H8: Perceived individual quality of life affects attitude toward pro-environmental behavior

H9: Perceived individual quality of life affects intention to participate in pro-environmental behavior

IV. Methodology

4.1 Data Collection

This study investigates factors that affect overall quality of life of individuals by participating in pro-environmental behavior in S. Korea. Data was collected through an anonymous online survey. The survey was distributed through Kakao Talk, SNSs, graduate school's home page, bulletin boards, etc. The questionnaire is composed of general questions (warm-up), main questions for independent variables, and questions for demographic characteristics. The survey's main questions are designed to find out what are significant factors in participating in pro-environmental behavior among economic benefits, social responsibility, environmental consciousness, sustainability, happiness, health, and environmental commitment. This study used the 5-point Likert scale of 1 – strongly disagree and 5 – strongly agree for major factors. The total of 100 respondents, composed of 100 Koreans, completed the survey. This study conducted Cronbach's alpha tests to verify reliability of questionnaire items and results are shown in Table 4.

Table 4. Cronbach's Alpha Reliability Test for the Factors in pro-environmental behavior

Factors	Statements	Actual Consumers

Economic Benefits	1. I think that participating in pro-environmental behavior can be economically beneficial (e.g., energy saving). 2. I think that pro-environmental behavior can be economically beneficial in the long run, even though it may require time and money upfront (e.g., a premium price policy for pro-environmental products). **Reliability (Cronbach's Alpha)**	**0.727**
Social Responsibility	1. I think that participating in pro-environmental behavior is following social trends. 2. I think that participating in pro-environmental behavior is a way of taking responsibility for society. 3. I think that participating in pro-environmental behavior can lead to positive social evaluations. 4. I participate because it gives me a sense of satisfaction in contributing to social change. **Reliability (Cronbach's Alpha)**	**0.756**
Environmental Consciousness	1. The environmental crisis is an important issue that our society is facing. 2. The environmental crisis is a problem that needs to be addressed collectively at the individual, corporate, and governmental levels. 3. There is a need for environmental crisis-related education. **Reliability (Cronbach's Alpha)**	**0.754**
Sustainability	1. By participating in pro-environmental behaviors, we can contribute to solving sustainability issues. 2. I think engaging in pro-environmental behaviors such as recycling or utilizing recycled products can contribute to sustainability. 3. Continuous efforts are needed for the future of the sustainability. **Reliability (Cronbach's Alpha)**	**0.840**
Environmental Commitment	1. The natural environment and humans are interdependent. 2. The natural environment must be considered in decision-making processes as many as possible. The natural environment is essential to our quality of life. Reliability (Cronbach's Alpha)	**0.782**
Happiness	1. I think participating in pro-environmental behavior can make me feel happy. 2. I think participating in pro-environmental behavior is helpful for my happiness. **Reliability (Cronbach's Alpha)**	**0.869**
Health	1. I think participating in pro-environmental behavior can be beneficial for physical health. 2. I think participating in pro-environmental behavior can be beneficial for mental health. **Reliability (Cronbach's Alpha)**	**0.806**

This study also summarized demographic characteristic of respondents. Table 5 summarizes the characteristics of respondents.

Table 5. Summarizing the Demographic of Respondents

	Frequency (*N*)	Valid Percent (*%*)
Gender		
Male	(51)	51.0%
Female	(49)	49.0%
Total	**(100)**	**100%**
Occupation		
Educational institution	(7)	7.0%
Civil servant	(10)	10.0%
Public sector employee	(10)	10.0%
Private sector employee	(20)	20.0%
Non-profit organization employee	(13)	13.0%
Self-employed	(8)	8.0%
Research institution employee	(7)	7.0%
Housewife	(6)	6.0%
Student	(15)	15.0%
Others	(4)	4.0%
Total	**(100)**	**100%**
Age		
21-24 years old	(8)	8.0%
25-29 years old	(25)	25.0%
30-34 years old	(13)	13.0%
35-39 years old	(9)	9.0%
40-44 years old	(10)	10.0%
45-49 years old	(8)	8.0%
50-54 years old	(6)	6.0%
55-59 years old	(6)	6.0%
More than 60 years old	(15)	15.0%
Total	**(100)**	**100%**
Education		
High school graduate	(18)	18.0%
2-year associated degree	(15)	15.0%
Bachelor degree	(49)	49.0
Master degree	(14)	14.0
Ph.D	(4)	4.0
Total	**(100)**	**100%**
Marriage		
Married	(52)	52.0
Unmarried	(48)	48.0%
Total	**(100)**	**100%**
Annual Salary		
Below KRW 10,000,000	(18)	18.0%
More or equal to KRW 10,000,000 ~ below KRW 20,000,000	(9)	9.0%
More or equal to KRW 20,000,000 ~ below KRW 30,000,000	(16)	16.0%
More or equal to KRW 30,000,000 ~ below KRW 40,000,000	(24)	24.0%
More or equal to KRW 40,000,000 ~ below KRW 50,000,000	(10)	10.0%
More or equal to KRW 50,000,000 ~ below KRW 60,000,000	(7)	7.0%
More or equal to KRW 60,000,000 ~ below KRW 70,000,000	(8)	8.0%
More or equal to KRW 70,000,000	(8)	8.0%
Total	**(100)**	**100%**

4.2 Data Analysis

In this study, the validity was verified by using factor analysis for the factors of pro-environmental analysis applying extraction method on varimax rotation with Kaiser normalization. This study used factors that calculated the Eigenvalues as greater than 1.00 for major factors including economic benefits, social responsibility, environmental consciousness, sustainability, happiness, health, and environmental commitment. Table 6 summarizes the results of factor analysis for each factor of pro-environmental behavior that affect actual individual quality of life.

Table 6. Component Matrix: Factors of pro-environmental behavior

Factors	Scale Items	Components						
		1	2	3	4	5	6	7
Economic benefit 1	I think that participating in pro-environmental behavior can be economically beneficial (e.g., energy saving).	.886						
Economic benefit 2	I think that pro-environmental behavior can be economically beneficial in the long run, even though it may require time and money upfront (e.g., a premium price policy for pro-environmental products).	.886						
Social 3	I think that participating in pro-environmental behavior can lead to positive social evaluations.		.833					
Social 4	I participate because it gives me a sense of satisfaction in contributing to social change.		.768					
Social 1	I think that participating in pro-environmental behavior is following social trends. I think that using electric vehicles give a responsibility to society.		.765					
Social_2	I think that participating in pro-environmental behavior is a way of taking responsibility for society.		.676					
Environmental Consciousness 1	The environmental crisis is a problem that needs to be addressed collectively at the individual, corporate, and governmental levels.			.888				
Environmental Consciousness 3	There is a need for environmental crisis-related education.			.800				
Environmental Consciousness 2	The environmental crisis is an important issue that our society is facing.			.776				
Sustainability2	I think engaging in pro-environmental behaviors such as recycling or utilizing recycled products can contribute to sustainability.				.910			

Sustainability1	By participating in pro-environmental behaviors, we can contribute to solving sustainability issues.				.863			
Sustainability3	Continuous efforts are needed for the future of the sustainability.				.839			
Environmental Commitment 1	The natural environment and humans are interdependent.					.863		
Environmental Commitment 2	The natural environment must be considered in decision-making processes as many as possible.					.862		
Environmental Commitment 3	The natural environment is essential to our quality of life.					.788		
Happiness 2	I think participating in pro-environmental behavior is helpful for my happiness.						.940	
Happiness 1	I think participating in pro-environmental behavior can make me feel happy.						.940	
Health 2	I think participating in pro-environmental behavior can be beneficial for mental health.							.915
Health 1	I think participating in pro-environmental behavior can be beneficial for physical health.							.915

This study applied factor scores for regression analysis to find out the significance of each factor. Table 7 describes how each factor of pro-environmental behavior affect individual's quality of life. The result of the ANOVA showed that overall, the model is significant with *R-square* = .603 and F = 19.987 at 0.01 level of significant.

Table 7. Effects of Factors on Quality of Life

Variable (Independent → dependent)	Standardized Coefficient (*t*-value-Sig)
Economic Benefits → Quality of Life (H1)	.407 (5.265***)
Social Responsibility → Quality of Life (H2)	.078 (.891)
Environmental Consciousness → Quality of Life (H3)	-.047 (-.518)
Sustainability → Quality of Life (H4)	.309 (3.149***)
Environmental Commitment → Quality of Life (H5)	-.088 (-.947)
Happiness → Quality of Life (H6)	.221 (2.571**)
Health → Quality of Life (H7)	.090(1.036)

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$ denotes statistical significance

The result of the ANOVA showed that overall, the model is significant with *R-square* = .320 and F = 46.124 at 0.01 level of significant in the case of attitude as a dependent variable. The result of the ANOVA showed that overall, the model is significant with *R-square* = .421 and

F = 71.404 at 0.01 level of significant in the case of intention to participate as a dependent variable.

Table 8. Effects of Quality of Life on Attitude and Intention to Participate

Variable (Independent → dependent)	Standardized Coefficient (*t*-value-Sig)
Quality of Life → Attitude (H8)	.566 (6.791***)
Quality of Life → Intention to participate (H9)	.649 (8.450***)

*** p < 0.01 denotes statistical significance

In conclusion, the result of hypotheses testing of factors related to pro-environmental behavior is summarized in Table 9.

Table 9. Summary of Effects of Factors on Quality of Life

Determinant	Hypothesis Testing	Result
Economic Benefits	Economic Benefits → Quality of Life (H1)	Accepted
Social Responsibility	Social Responsibility → Quality of Life (H2)	Rejected
Environmental Consciousness	Environmental Consciousness → Quality of Life (H3)	Rejected
Sustainability	Sustainability → Quality of Life (H4)	Accepted
Environmental Commitment	Environmental Commitment → Quality of Life (H5)	Rejected
Happiness	Happiness → Quality of Life (H6)	Accepted
Health	Health → Quality of Life (H7)	Rejected
Quality of Life	Quality of Life → Attitude (H8)	Accepted
Quality of Life	Quality of Life → Intention to participate (H9)	Accepted

V. Conclusion

5.1 The Summary of Findings

The purpose of this study is to explore factors that affect individual quality of life and how quality of life affects attitude and intention to participate in pro-environmental behavior. The results of this study found that economic benefits, sustainability, and happiness factors showed significance on individual quality of life by participating in pro-environmental behavior. Therefore, H1, H4, and H6 were accepted. Among factors, economic benefits showed stronger effect size followed by sustainability and happiness. Effects of factors including social responsibility,

environmental consciousness, environmental commitment, and health on individual quality of life were not significant. Therefore, H2, H3, H5, and H7 were rejected.

The results of this study implied that both actual and potential pro-environmental behavior participants perceive participating in pro-environmental behavior can be economically beneficial in the long run, even though it may require time and money upfront. The results also implied that both actual and potential pro-environmental behavior participants think engaging in pro-environmental behavior such as recycling or utilizing recycled products can contribute to sustainability and solve sustainability issues, and continuous efforts are needed for the future of the sustainability. Actual and potential pro-environmental behavior participants also think that participating in pro-environmental behavior is helpful for their happiness. In conclusion, the results of this study imply that participation in pro-environmental behavior has a positive impact on the individual quality of life because it contributes to pro-environmental behavior participants' economic benefits, improving the sustainability of society, and their own happiness.

However, the results implied that both actual and potential pro-environmental behavior participants do not perceive participating in pro-environmental behavior as a social issue. They do not perceive that participating in pro-environmental behavior is following social trends and can lead to positive social evaluations. They also do not perceive that participating in pro-environmental behavior is a way of taking responsibility in a society. According to the study results, actual and potential pro-environmental behavior participants' quality of life are not affected by environmental consciousness, environment commitment, and health factors. This study found that quality of life by participating in pro-environmental behavior showed significance on attitude and intention to participate in pro-environmental behavior. Therefore, H8 and H9 were accepted.

5.2 Policy and Managerial Implications

By identifying the factors that affect attitudes toward pro-environmental behavior and intention to participate in pro-environmental behavior, this study proposes promotional and regulatory policy implications. This study also suggests the importance and expected implications of policies for the government and companies that produce eco-friendly products by examining perceived effects based on the perspectives of actual and potential pro-environmental behavior participants.

First, economic benefits were found to have a positive effect on the individual quality of life by participating in pro-environmental behavior. Actual and potential pro-environmental behavior participants recognized that participating in pro-environmental behavior has economic benefits, which increase their quality of life by participating in pro-environmental behavior. It means that it is necessary for the government to promote policies that provide economic and financial incentives to citizens and make citizens feel their quality of life is increasing by participating in pro-environmental behavior. From a management point of view, it is important for companies that sells eco-friendly products to actively promote what economic benefits consumers can gain by purchasing eco-friendly products.

Second, actual and potential pro-environmental participants believe that continuous efforts are needed for a sustainable future because sustainability issues can be solved by participating in pro-environmental behavior, and in this regard, participation in pro-environmental behavior improves their quality of life. Therefore, the government will need to actively promote how citizens can help solve sustainability issues in our society by participating in pro-environmental behavior along with policies that provide economic incentives. Companies will also need to

communicate to consumers in various ways how their products help improve the sustainability of our society.

Third, happiness factor was found to be closely related to the individual quality of life by participating in pro-environmental behavior. Actual and potential pro-environmental behavior participants perceive participating in pro-environmental behavior is helpful for their happiness. It can be seen that the happiness itself gained from participating in pro-environmental behavior is leading to improvement in their quality of life. Considering this, the government and companies need to devise ways to share with more citizens how people feel happiness and their quality of life is increasing through participation in pro-environmental behavior.

Finally, individuals who think pro-environmental behavior improves their quality of life showed a positive attitude toward pro-environmental behavior and intention to continue to participate in pro-environmental behavior. Also, according to the results of this study, economic benefits, sustainability, and happiness were found to have positive effect on individual quality of life by participating in pro-environmental behavior. Therefore, the government needs to create a policy foundation that allows participation in pro-environmental behavior to lead to improved individual quality of life, focusing on the economic benefits, sustainability, and happiness factors, so that citizens can have a positive perception of pro-environmental behavior and continue to participate in pro-environmental behavior in the future.

5.3 Limitation and Future Research

This paper has limitations. The sample size could be improved in the future study. Additional research is needed to explore other factors besides factors that applied in this study to measure individual quality of life by participating in pro-environmental behavior, attitude toward

pro-environmental behavior, and intention to participate in pro-environmental behavior. Also, this study results are limited to Korea, as data was collected only from Koreans. Given the differences between countries, applying the research model to different countries may result in further studies. Finally, this study analyzed those who are participating in pro-environmental behavior and those who are willing to participate in pro-environmental behavior. If results can be derived by separating them in the future studies, each factors that are important to those who are currently participating in pro-environmental behavior and those who are willing to participate in pro-environmental behavior can be identified separately. This can be the basis for more effective government policies related to pro-environmental behavior, and it will also provide companies with clearer insights on what promotions should be carried out for consumers who do not currently purchase eco-friendly products.

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Appendix

Survey Questionnaire

Thank you for your participation in this survey. This survey is conducted to investigate your opinions on participation in eco-friendly behavior. Your answers will be used for research purposes only. Your responses to this survey are strictly confidential and will not be revealed to anyone other than researchers. Participation in this survey must be voluntary. All data will also be kept anonymously.Thank you once again for participating in the research on awareness and willingness to engage in eco-friendly behaviors. When answering each question, please do so based on your own experience if you have participated in eco-friendly behavior. Even if you do not have such experience, please select your own opinions about what you would think if you were to participate. This survey defines eco-friendly behavior as both personal and collective actions that contribute to environmental protection, including individual actions such as waste segregation, energy saving, eco-friendly product purchase, and public transportation use as well as collective actions such as environmental movement participation and environmental event participation.

1. Have you ever participated in eco-friendly behaviors?
   (1) Yes, I have participated. (2) No, I have not participated.

2. Have you ever received environmental education?
   (1) Yes, I have received education. (2) No, I have not received education.

3. Below are questions about **the economic factors** of eco-friendly behavior. Please answer each of the questions below.

		Strongly Disagree		Neutral		Strongly Agree
		1	2	3	4	5
1	I think that participating in eco-friendly behavior can be economically beneficial (e.g., energy saving).					
2	I think that eco-friendly behavior can be economically beneficial in the long run, even though it may require time and money upfront (e.g., a premium price policy for eco-friendly products).					

4. Below are questions about **the social factors** of eco-friendly behavior. Please answer each of the questions below.

		Strongly Disagree		Neutral		Strongly Agree
		1	2	3	4	5
1	I think that participating in eco-friendly behavior is following social trends.					
2	I think that participating in eco-friendly behavior is a way of taking responsibility for society.					
3	I think that participating in eco-friendly behavior can lead to positive social evaluations.					

4	I participate because it gives me a sense of satisfaction in contributing to social change.					

5. Below are questions about eco-friendly behaviors and **<u>environmental consciouness</u>**. Please answer each of the questions below.

		Strongly Disagree		Neutral		Strongly Agree
		1	2	3	4	5
1	The environmental crisis is an important issue that our society is facing.					
2	The environmental crisis is a problem that needs to be addressed collectively at the individual, corporate, and governmental levels.					
3	There is a need for environmental crisis-related education.					

6. Below are questions about eco-friendly behaviors and **<u>sustainability</u>**. Please answer each of the questions below.

		Strongly Disagree		Neutral		Strongly Agree
		1	2	3	4	5
1	By participating in eco-friendly behaviors, we can contribute to solving sustainability issues.					
2	I think engaging in eco-friendly behaviors such as recycling or utilizing recycled products can contribute to sustainability.					
3	Continuous efforts are needed for the future of the sustainability.					

7. Below are questions about eco-friendly behaviors and **<u>environmental commitment</u>**. Please answer each of the questions below.

		Strongly Disagree		Neutral		Strongly Agree
		1	2	3	4	5
1	The natural environment and humans are interdependent.					
2	The natural environment must be considered in decision-making processes as many as possible.					
3	The natural environment is essential to our quality of life.					

8. Below are questions about eco-friendly behaviors and **<u>Health</u>**. Please answer each of the questions below.

		Strongly Disagree		Neutral		Strongly Agree
		1	2	3	4	5

1	I think participating in eco-friendly behavior can be beneficial for physical health.					
2	I think participating in eco-friendly behavior can be beneficial for mental health.					

9. Below are questions about eco-friendly behaviors and **happiness**. Please answer each of the questions below.

		Strongly Disagree		Neutral		Strongly Agree
		1	2	3	4	5
1	I think participating in eco-friendly behavior can make me feel happy.					
2	I think participating in eco-friendly behavior is helpful for my happiness.					

10. Overall, my attitude toward eco-friendly behaviors is positive.

← Strongly disagree		Neutral		Strongly agree →
1	2	3	4	5

11. Please provide your answer regarding overall satisfaction when participating in eco-friendly behaviors.

← Highly dissatisfied		Neutral		Highly satisfied →
1	2	3	4	5

12. Do you have any intention of participating more actively in eco-friendly behaviors in the future? (<u>If you have never participated</u> in eco-friendly behavior, please indicate if you would like to participate in the future; <u>if you have participated</u> in eco-friendly behavior, please indicate if you would like to continue participating).

← Highly negative		Neutral		Highly positive →
1	2	3	4	5

I think overall, participating in eco-friendly behaviors will improve the quality of life.

← Strongly disagree		Neutral		Strongly agree →
1	2	3	4	5

13. Below are questions about **<u>the need for government policies</u>** in relation to eco-friendly behaviors.

Please answer each of the questions below.

		Strongly Disagree		Neutral		Strongly Agree
		1	2	3	4	5
1	It is necessary for the government to come up with a policy to encourage eco-friendly behavior that fits the situation in Korea.					

2	Better laws and regulations should be put in place to promote eco-friendly behavior.					
3	There is a need for appropriate policies by the government regarding eco-friendly behaviors.					

14. Below are questions about **government promotion policies** in relation to eco-friendly behaviors.

    Please answer each of the questions below.

		Strongly Disagree		Neutral		Strongly Agree
		1	2	3	4	5
1	Publicizing eco-friendly behavior by the central and local governments is an effective policy to promote eco-friendly behavior.					
2	Eco-friendly certification granted by the government and accredited institutions is an effective policy to promote eco-friendly behavior.					
3	Policies that reflect the actual research results on eco-friendly behavior are effective policies to promote eco-friendly behavior.					
4	Government policies to promote eco-friendly behavior should be designed to be beneficial to citizens.					
5	I think collaborating with corporates is helpful for the implementation of government policies aimed at promoting and activating eco-friendly behaviors.					

15. Below are questions about **government regulatory policies** in relation to eco-friendly behaviors.

    Please answer each of the questions below.

		Strongly Disagree		Neutral		Strongly Agree
		1	2	3	4	5
1	Government regulation of corporates' exaggerated eco-friendly product launches and advertising is effective.					
2	Better government's policy for eco-friendly products and services will help reduce environmental problems.					
3	The government should put in place appropriate regulations for citizen behavior that causes environmental problems.					
4	The government should put in place appropriate regulations for corporate behavior that causes environmental problems.					

16. Please select your overall attitude toward government policies on eco-friendly behavior.

← Highly negative		Neutral		Highly positive →
1	2	3	4	5

17. Please select your overall satisfaction level with regard to government policies on eco-friendly behavior.

← Highly negative		Neutral		Highly positive →
1	2	3	4	5

18. Please select your gender.
    (1) Male
    (2) Female

19. Please select your profession.
    (1) Education-related
    (2) Civil servant
    (3) Public sector employee
    (4) Private sector employee
    (5) Nonprofit organization employee
    (6) Self-employed
    (7) Research institution employee
    (8) Housewife
    (9) Student
    (10) Others ( )

20. Please select your age.
    (1) 21–24 years
    (2) 25–29 years
    (3) 30–34 years
    (4) 35–39 years
    (5) 40–44 years
    (6) 45–49 years
    (7) 50–54 years
    (8) 55–59 years
    (9) over 60 years old

21. Please select your final educational attainment.

    (1) High school
    (2) 2 year associate degree
    (3) University
    (4) Masters
    (5) Ph.D.

22. Please select your marital status.
    (1) Married
    (2) Single

23. Please select your annual income.
    (1) Less than KRW 10 million
    (2) KRW 10 million–KRW 20 million
    (3) KRW 20 million–KRW 30 million

(4) KRW 30 million–KRW 40 million
(5) KRW 40 million–KRW 50 million
(6) KRW 50 million–KRW 60 million
(7) KRW 60 million–KRW 70 million
(8) KRW 70 million or higher

Thank you for your participation in this survey.