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ความคิดเห็นของผู้บริโภคที่มีต่อฉลากทางสิ่งแวดล้อมของผลิตภัณฑ์ก่อสร้างในประเทศไทย

Consumer Perception of Environmental Label of Construction Material Products in Bangkok

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FINAL REPORT

CONSUMER PERCEPTION OF ENVIRONMENTAL LABEL OF CONSTRUCTION MATERIAL PRODUCTS IN BANGKOK

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INTERNATIONAL COLLEGE

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ชื่อโครงการ	ความคิดเห็นของผู้บริโภคที่มีต่อฉลากทางสิ่งแวดล้อมของผลิตภัณฑ์ก่อสร้างในประเทศไทย Consumer Perception of Environmental Label of Construction Material Products in Bangkok
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ABSTRACT

Due to the increase of public environmental awareness especially in terms of climate change and resource depletion problems, consumers tend to change their consumption preference towards sustainable development and circular economy concepts. Green and environmentally friendly products are becoming more demanded in various business sectors. Therefore, manufacturers are driven to change their products to be more eco-friendly. Theoretically, being green should save some costs; however, this business transformation requires some investment and may cause product's price to increase. Thus, it is important to understand whether or not the consumers are willing to pay more for being "green" along with other factors that influence their green purchasing decisions. The study found that approximately 90% of the respondents are willing to pay more for green ophthalmic lens products compared to typical ophthalmic lens products. There is also some relationship between green awareness and willingness to pay more for green products. The results of the study can be used to enact government sustainability policies and business strategies.

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1. INTRODUCTION

Green consumption has gained more interests by the public due to the increased environmental awareness. Ecologically friendly products are the key part of green consumption. In general, ecologically friendly product refers to the products that pose relatively lower environmental impacts to produce and consume compared to other products of its peer. The environmental impacts are considered throughout the product cycle including production, logistics, consumption, and disposal at the end of its lifecycle [1, 2, 3]. In the market, there are many terms that imply such products such as green products, environmentally friendly products, sustainable products, planet friendly product, and organic products depending on market sectors and marketing strategies of the producers [1].Based on a survey in 2013, there have been 70% more demands for ecologically friendly products in the US [4]. Many companies introduced their ecologically friendly products into the market. For example, Nike introduced its sport wares produced from polyester fibre from recycled plastic bottles. Coca-cola introduced packaging materials that can be 100% recycled [4].

In Thailand, Siam Cement Group (SCG), one of the biggest construction material and home decoration product producers in Thailand launched its 'SCG eco value' label for its products in2009 [5]. The company stated that SCG eco value is a self-declared eco-label of SCG to ensure its environmentally-friendly products and services, which is one tool that SCG uses to communicate a product's environmental friendliness to the stakeholders that are able to choose the products and services concerning to environmental care [5]. In some cases, however, green products are priced higher compared to the same products of their peers. This is quite ironic considering that, theoretically, green product should consume less resource to produce.

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Ophthalmic lens are the tools used for eye corrections such as presbyopia, hyperopia, myopia, and astigmatism. Ophthalmic lens have many varieties for example, clear lens, transitions lens, and polarized lens. Based on a survey by Essilor, the world's largest ophthalmic lens producer, approximately 4.6 billion people need vision correction. It means that there are an approximate total of 9.2 billion lens demanded globally [6]. Ophthalmic lens production requires considerable amount of water consumption. Their packaging materials and wastes at the end of product life cycle also generate an enormous amount of wastes. Due to limited availability of green ophthalmic lens products especially in Thailand market, there is a need for study to investigate the perception of ophthalmic lens users towards the products of this kind. Ophthalmic lens producers can use the findings of this study to make investment on production process modification and marketing strategies in response to this green consumer demands.

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2. OPHTHALMIC LENS PRODUCTION AND RESOURCE CONSUMPTION

Ophthalmic lens production requires two main raw materials including glass and plastic. Presently, plastic lens are more preferable by customers because of their light-weight, durability and safety. In general, there are two types of lens production: made-to-stock and made-to-order lens. This section describes the production of Rx lens, which is a kind of made-to-order lens. Production process starts with the use of Semi-finished (SF) lens. The SF lens has eye correction values due to their polymer convex surface. A considerable amount of water is required in this polymer setting process. Water is used for lens polishing, cleaning, hard-coating, and anti-reflection coating. Production process also includes lens generating, which generates a lot of plastic wastes. Packaging material is also a large source of wastes. Due to the huge amount of lens demands based on sustainability report 2015, it is approximated that lens company consuming water and energy 4.8 million liters and 709.5 GWh and generating the industrial waste of 21kT [7].

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3. LITERATURE REVIEW

3.1 Internal factor influencing green consumption

Internal factors that influence green consumption are somewhat related to environmental awareness and attitude [8]. Environmental awareness and attitude are the key drivers to understand environmental impacts resulted from human beings [2]. For example, consumers who have good environmental awareness should be aware that less agricultural product outcome is partially due to climate change impacts [8]. Some people who prefer to consume organic products because they are aware of chemicals used in non-green production processes [9]. However, a survey in 1993 revealed that people who consumed ecologically friendly products were driven from allergy problems, which are sometimes related to environmental conditions. These problems make them aware the impacts of deteriorated environmental conditions. However, there was no clear evidence that this awareness has significant relationship with gender and level of education [10, 11].

3.2 External factors influencing green consumption

Green consumption can also be influenced by external factors. For example, consumers may be influenced by the society they live in [1, 12, 13]. Currently, there is an increasing trend of environmental awareness and conservation [14]. Some people may follow green consumption led by their colleagues once they have learnt the benefits of ecologically friendly products [11]. Green label is also an important driver for green consumption since it provides information about benefits of green products such as energy saving and emission data on their packages [15, 16, 17]. Beside of the benefits to themselves, consumers also value producers' reputation in terms of Corporate Social

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Responsibility (CSR). They tend of weigh this factor in purchasing decision no less than the products themselves [17].

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4. RESEARCH METHOD

4.1 Measurement Instrument

The study aimed to understand the relationship consumers' environmental awareness and willingness to pay more for ecologically friendly products using ophthalmic lens as a case study. This study used a survey as a data collection tool. The survey consists of 4 sections including 1) demographic characteristics; 2) environmental problem awareness; 3) green attitude; and 4) willingness to pay more for ecologically friendly products. A five-point Likert scale was used in the survey. The scale ranged from 1 to 5, indicating [1] = strongly disagree, [2] = disagree, [3] = neutral agree, [4] = agree, and [5] = strongly agree.

4.2 Data Collection

A structured questionnaire was pretested for its validity and reliability before distribution. As presented in Table 1, Cronbach's alpha ranged from 0.81 to 0.98, which are acceptable. The questionnaire was distributed using social media and email networks A total of 207 responses were received. The Kaiser-Mayer-Olkin result of 0.914 showed a sufficient sampling adequacy of factor analysis. that sustainability performance due to investor's preference towards well-performed sustainability.

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Table 1 Reliability analysis

	Cronbach's alpha	Mean	Std. dev.
Environmental problem awareness	0.8056	4.62	0.65
Green habit attitude	0.8905	3.65	1.00
Willingness to pay more for green ophthalmic lens	0.9752	2.86	1.14

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5. RESULTS

5.1 Respondents Demography

Demographic information of the respondents are presented in Table 2. Approximately 79.6% of the respondents have some experience in ophthalmic lens purchasing. Approximately 63.7% and 36.3% of the respondents are female and male, respectively. The socio-economic status of respondents were surveyed based on income tax levels in Thailand. Compared to the legally required minimum salary for bachelor degree holders in Thailand of 15,000 baht, the majority of the respondents deem middle-class. Approximately 93% of the respondents earn more than 25,000 baht per month. Over 90% of the respondents have at least bachelor degree or higher.

Table 2 Demography

Experience in ophthalmic lens purchasing	
Had experience in ophthalmic lens purchasing	79.6 %
Did not have experience in ophthalmic lens purchasing	20.4 %
Gender	
Male	36.3%
Female	63.7%
Personal incomes	
Less than 25000 baht per month	7%
25,001 to 45000 baht per month	37.9%
More than 45001 baht per month	55.1%
Education	
High school	1%
Bachelor's degree	56.5%
Graduate degree or higher	42%
Others	0.5%

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5.2 Relationship among environmental awareness, green habit attitude, and willingness to pay more

Definition of environmental awareness is knowing environment problem status, what behavior can be a cause of the environment problem and consequence. For example, knowing the world are facing global warming issue and it is caused by human generating the pollution. And definition of green habit attitude is how preference to be green in daily activities such as preferring to use the cloth bag than plastic bag. This section summarizes the results of hypothesis tests using regression analysis. The null hypothesis fails if p-value is greater than 0.05. The results are presented in Table 3. In summary, the results show that:

1) There is relationship between environmental awareness and willingness to pay for green ophthalmic lens products.

2) There is no relationship between green habit attitude and willingness to pay for green ophthalmic lens products.

However, approximately 90% of the respondents indicated that would be willing to pay more for green ophthalmic lens. As presented in table 4, the majority of them are willing to pay up to 5% more for green ophthalmic lens products. From the result of regression, environmental awareness supports the willingness to pay more on green ophthalmic lens product. But green habit attitude does not support on willingness to pay more on green ophthalmic lens. It is interesting to learn that some respondents, who deny to pay more, believe that making the products green should be producers' responsibility if it is going to cost more. Though, they would choose to buy general green products if they are priced the same as traditional non-green products.

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Table 3 Result of regression for relationship among awareness, attitude, and willingness to pay more

Willingness to pay more for green ophthalmic lens products			
	Estimate	S.E.	p-value
Awareness on environment problem	0.351	0.158	0.027
Attitude on green habit	0.064	0.106	0.548

Table 4 Number of respondents for level of willingness to pay more

Level of willingness to pay more for green ophthalmic lens	Number of respondents (%)
1% - 5%	47
6% - 10%	15
11% -15%	17
16% - 20%	7
21% - 25%	1
25% -30%	1
More than 30%	2
Deny willingness to pay more for green ophthalmic lens	10

5.3 Relationship between demographic conditions and willingness to pay more on green ophthalmic lens

The results of hypothesis testing about relationship between demographic conditions and willingness to pay more on green ophthalmic lens are presented in Table 5. Key findings are summarized as follows:

1) There is no relationship between gender and willingness to pay more for green ophthalmic lens products.

2) There is no relationship between personal incomes and willingness to pay more for green ophthalmic lens products.

3) There is no relationship between educational levels and willingness to pay more for green ophthalmic lens products.

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Table 5 Chi-square test for relationship demographic conditions and willingness to pay more for green ophthalmic lens

Demographic condition	p-value
Gender	0.984
Personal incomes	0.177
Education level	0.764

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6. CONCLUSIONS

A survey study has been conducted to find relationship between willingness to pay more for green products and green awareness and attitude focusing on ophthalmic lens products in Thailand. The survey also attempted to find the relationship between willingness to pay and some demographic conditions such as gender, level of education and incomes level. Based on the results of the study, there was significant relationship between green awareness and willingness to pay but there was no significant relationship between attitude and any demographic conditions. This is somewhat in line with findings of other studies in the past. However, it is interesting to find that some respondents indicate that additional costs, if any, for being green should be absorbed by the producers. They would still prefer to buy green products if they cost the same as non-green products. It should also be noted that this study focused on ophthalmic lens products in Thailand. The conclusions may be different for other product sectors in Thailand or different countries.

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CONFERENCE PROCEEDINGS

Arnoma Grand Hotel, Bangkok, Thailand
Hosted by The Waste Incineration Research Center
Department of Mechanical and Aerospace Engineering
Faculty of Engineering
King Mongkut's University of Technology North Bangkok
Bangkok, Thailand

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	Vipa Thongtus, Sasikarn Nuchdang, Papin Chirathivat, Suchata Kirdponpattara, Chantaraporn Phalakornkule
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	Peiqing Cao, Takashi Fujimori, Albert Juhasz, Masaki Takaoka
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	Sothea Long, Jaruwit Prabnasak, Ronnachai Tiyarattanachai
ICIPEC-0078	CONSUMER PERSPECTIVES ON THE PREMIUM PRICE OF ECOLOGICALLY FRIENDLY PRODUCT: A CASE STUDY OF OPHTHALMIC LENS IN THAILAND
	Nida Tuna
ICIPEC-0080	OPTIMIZATION AND INVESTIGATION OF A FREE-PISTON STIRLING ENGINE BASED ON POWER AND FREQUENCY USING GENETIC ALGORITHM
	Pongnarin Savangvong, Banterng Silpsakoolsook, Sutapat Kwankaomeng
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ICIPEC-0078

Consumer perspectives on premium price of ecologically friendly product: a case study of ophthalmic lens in Thailand

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Abstract. Due to the increase of public environmental awareness especially in terms of climate change and resource depletion problems, consumers tend to change their consumption preference towards sustainable development and circular economy concepts. Green and environmentally friendly products are becoming more demanded in various business sectors. Therefore, manufacturers are driven to change their products to be more eco-friendly. Theoretically, being green should save some costs; however, this business transformation requires some investment and may cause product's price to increase. Thus, it is important to understand whether or not the consumers are willing to pay more for being "green" along with other factors that influence their green purchasing decisions. The study found that approximately 90% of the respondents are willing to pay more for green ophthalmic lens products compared to typical ophthalmic lens products. There is also some relationship between green awareness and willingness to pay more for green products. The results of the study can be used to enact government sustainability policies and business strategies.

1. Introduction

Green consumption has gained more interests by the public due to the increased environmental awareness. Ecologically friendly products are the key part of green consumption. In general, ecologically friendly product refers to the products that pose relatively lower environmental impacts to produce and consume compared to other products of its peer. The environmental impacts are considered throughout the product cycle including production, logistics, consumption, and disposal at the end of its lifecycle [1, 2, 3]. In the market, there are many terms that imply such products such as green products, environmentally friendly products, sustainable products, planet friendly product, and organic products depending on market sectors and marketing strategies of the producers [1].Based on a survey in 2013, there have been 70% more demands for ecologically friendly products in the US [4]. Many companies introduced their ecologically friendly products into the market. For example, Nike introduced its sport wares produced from polyester fibre from recycled plastic bottles. Coca-cola introduced packaging materials that can be 100% recycled [4].

In Thailand, Siam Cement Group (SCG), one of the biggest construction material and home decoration product producers in Thailand launched its 'SCG eco value' label for its products in2009 [5]. The company stated that SCG eco value is a self-declared eco-label of SCG to ensure its environmentally-friendly products and services, which is one tool that SCG uses to communicate a product's environmental friendliness to the stakeholders that are able to choose the products and services

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concerning to environmental care [5]. In some cases, however, green products are priced higher compared to the same products of their peers. This is quite ironic considering that, theoretically, green product should consume less resource to produce. Ophthalmic lens are the tools used for eye corrections such as presbyopia, hyperopia, myopia, and astigmatism. Ophthalmic lens have many varieties for example, clear lens, transitions lens, and polarized lens. Based on a survey by Essilor, the world's largest ophthalmic lens producer, approximately 4.6 billion people need vision correction. It means that there are an approximate total of 9.2 billion lens demanded globally [6]. Ophthalmic lens production requires considerable amount of water consumption. Their packaging materials and wastes at the end of product life cycle also generate an enormous amount of wastes. Due to limited availability of green ophthalmic lens products especially in Thailand market, there is a need for study to investigate the perception of ophthalmic lens users towards the products of this kind. Ophthalmic lens producers can use the findings of this study to make investment on production process modification and marketing strategies in response to this green consumer demands.

2. Ophthalmic lens production and resource consumption

Ophthalmic lens production requires two main raw materials including glass and plastic. Presently, plastic lens are more preferable by customers because of their light-weight, durability and safety. In general, there are two types of lens production: made-to-stock and made-to-order lens. This section describes the production of Rx lens, which is a kind of made-to-order lens. Production process starts with the use of Semi-finished (SF) lens. The SF lens has eye correction values due to their polymer convex surface. A considerable amount of water is required in this polymer setting process. Water is used for lens polishing, cleaning, hard-coating, and anti-reflection coating. Production process also includes lens generating, which generates a lot of plastic wastes. Packaging material is also a large source of wastes. Due to the huge amount of lens demands based on sustainability report 2015, it is approximated that lens company consuming water and energy 4.8 million liters and 709.5 GWh and generating the industrial waste of 21kT [7].

3. Literature review

3.1. Internal factor influencing green consumption

Internal factors that influence green consumption are somewhat related to environmental awareness and attitude [8]. Environmental awareness and attitude are the key drivers to understand environmental impacts resulted from human beings [2]. For example, consumers who have good environmental awareness should be aware that less agricultural product outcome is partially due to climate change impacts [8]. Some people who prefer to consume organic products because they are aware of chemicals used in non-green production processes [9]. However, a survey in 1993 revealed that people who consumed ecologically friendly products were driven from allergy problems, which are sometimes related to environmental conditions. These problems make them aware the impacts of deteriorated environmental conditions. However, there was no clear evidence that this awareness has significant relationship with gender and level of education [10, 11].

3.2. External factors influencing green consumption

Green consumption can also be influenced by external factors. For example, consumers may be influenced by the society they live in [1, 12, 13]. Currently, there is an increasing trend of environmental awareness and conservation [14]. Some people may follow green consumption led by their colleagues once they have learnt the benefits of ecologically friendly products [11]. Green label is also an important driver for green consumption since it provides information about benefits of green products such as energy saving and emission data on their packages [15, 16, 17]. Beside of the benefits to themselves, consumers also value producers' reputation in terms of Corporate Social Responsibility

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(CSR). They tend of weigh this factor in purchasing decision no less than the products themselves [17].

4. Research Method

4.1 Measurement Instrument

The study aimed to understand the relationship consumers' environmental awareness and willingness to pay more for ecologically friendly products using ophthalmic lens as a case study. This study used a survey as a data collection tool. The survey consists of 4 sections including 1) demographic characteristics; 2) environmental problem awareness; 3) green attitude; and 4) willingness to pay more for ecologically friendly products. A five-point Likert scale was used in the survey. The scale ranged from 1 to 5, indicating [1] = strongly disagree, [2] = disagree, [3] = neutral agree, [4] = agree, and [5] = strongly agree.

4.2 Data collection

A structured questionnaire was pretested for its validity and reliability before distribution. As presented in Table 1, Cronbach's alpha ranged from 0.81 to 0.98, which are acceptable. The questionnaire was distributed using social media and email networks A total of 207 responses were received. The Kaiser-Mayer-Olkin result of 0.914 showed a sufficient sampling adequacy of factor analysis.

Table 1. Reliability analysis.

	Cronbach's alpha	Mean	Std. dev.
Environmental problem awareness	0.8056	4.62	0.65
Green habit attitude	0.8905	3.65	1.00
Willingness to pay more for green ophthalmic lens	0.9752	2.86	1.14

5. Results

5.1 Respondents demography

Demographic information of the respondents are presented in Table 2. Approximately 79.6% of the respondents have some experience in ophthalmic lens purchasing. Approximately 63.7% and 36.3% of the respondents are female and male, respectively. The socio-economic status of respondents were surveyed based on income tax levels in Thailand. Compared to the legally required minimum salary for bachelor degree holders in Thailand of 15,000 baht, the majority of the respondents deem middle-class. Approximately 93% of the respondents earn more than 25,000 baht per month. Over 90% of the respondents have at least bachelor degree or higher.

Table 2. Demography

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Experience in ophthalmic lens purchasing	
Had experience in ophthalmic lens purchasing	79.6 %
Did not have experience in opthalmic lens purchasing	20.4 %
Gender	
Male	36.3%
Female	63.7%
Personal incomes	
Less than 25000 baht per month	7%
25,001 to 45000 baht per month	37.9%
More than 45001 baht per month	55.1%
Education	
High school	1%
Bachelor's degree	56.5%
Graduate degree or higher	42%
Others	0.5%

5.2 *Relationship among environmental awareness, green habit attitude, and willingness to pay more.*
Definition of environmental awareness is knowing environment problem status, what behavior can be a cause of the environment problem and consequence. For example, knowing the world are facing global warming issue and it is caused by human generating the pollution. And definition of green habit attitude is how preference to be green in daily activities such as preferring to use the cloth bag than plastic bag. This section summarizes the results of hypothesis tests using regression analysis. The null hypothesis fails if p-value is greater than 0.05. The results are presented in Table 3. In summary, the results show that:

1) There is relationship between environmental awareness and willingness to pay for green ophthalmic lens products.
2) There is no relationship between green habit attitude and willingness to pay for green ophthalmic lens products.

However, approximately 90% of the respondents indicated that would be willing to pay more for green ophthalmic lens. As presented in table 4, the majority of them are willing to pay up to 5% more for green ophthalmic lens products. From the result of regression, environmental awareness supports the willingness to pay more on green ophthalmic lens product. But green habit attitude does not support on willingness to pay more on green ophthalmic lens. It is interesting to learn that some respondents, who deny to pay more, believe that making the products green should be producers' responsibility if it is going to cost more. Though, they would choose to buy general green products if they are priced the same as traditional non-green products.

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Table 3. Result of regression for relationship among awareness, attitude, and willingness to pay more.

Willingness to pay more for green ophthalmic lens products			
	Estimate	S.E.	p-value
Awareness on environment problem	0.351	0.158	0.027
Attitude on green habit	0.064	0.106	0.548

Table 4. Number of respondents for level of willingness to pay more

Level of willingness to pay more for green ophthalmic lens	Number of respondents (%)
1% - 5%	47
6% - 10%	15
11% -15%	17
16% - 20%	7
21% - 25%	1
25% -30%	1
More than 30%	2
Deny willingness to pay more for green ophthalmic lens	10

5.3. Relationship between demographic conditions and willingness to pay more on green ophthalmic lens.

The results of hypothesis testing about relationship between demographic conditions and willingness to pay more on green ophthalmic lens are presented in Table 5. Key findings are summarized as follows:

1) There is no relationship between gender and willingness to pay more for green ophthalmic lens products.
2) There is no relationship between personal incomes and willingness to pay more for green ophthalmic lens products.
3) There is no relationship between educational levels and willingness to pay more for green ophthalmic lens products.

Table 5. Chi-square test for relationship demographic conditions and willingness to pay more for green ophthalmic lens

Demographic condition	p-value
Gender	0.984
Personal incomes	0.177
Education level	0.764

6. Conclusions

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A survey study has been conducted to find relationship between willingness to pay more for green products and green awareness and attitude focusing on ophthalmic lens products in Thailand. The survey also attempted to find the relationship between willingness to pay and some demographic conditions such as gender, level of education and incomes level. Based on the results of the study, there was significant relationship between green awareness and willingness to pay but there was no significant relationship between attitude and any demographic conditions. This is somewhat in line with findings of other studies in the past. However, it is interesting to find that some respondents indicate that additional costs, if any, for being green should be absorbed by the producers. They would still prefer to buy green products if they cost the same as non-green products. It should also be noted that this study focused on ophthalmic lens products in Thailand. The conclusions may be different for other product sectors in Thailand or different countries.

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