A Study on Consumer Behavior and Preference towards Textile materials with Environment-Friendly treatment[+]

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Abstract

Nowadays people are turning to have a more intimate environment-friendly lifestyles. In the clothing industry they are focusing on making products that are more human-friendly and not harmful to the environment. In the midst of the spread of consumption research is being done to develop manufacturing textiles that do not induce pollution. For instance, advantages of the natural textile fibers, cotton, silk, and ramie, have been newly recognized in terms of environment-friendliness, Together with these fibers, the natural high molecular materials, such as chitosan and hyaluronic acid, have found new roles in the application sectors of human-friendliness and environment-friendliness. Products using these substances and processing methods can make the products more wearable, have high sensitivity, make people feel aesthetic appreciation for the products, and make them appreciate the value of a more healthier environment. In a survey according to subjects in their 20s and 30s, their preferences towards their consciousness and awareness of the development of materials as well as their attitude towards environment-friendly products were determined as a conclusion.

It was shown that consumers that are more conscious about the interest of the environment as well as the problems concerning the environment were more intent on buying products that were environmentally-friendly. Women have shown more active and positive attitudes towards the importance of the awareness of the environment in comparison with men. Generally, consumers in their 20s and 30s preferred the feel of materials that were less than 1% concentration process than those of materials that were 1% concentration process. To increase the "rustly" feeling of the materials, it was found that 1% concentration process was suitable for manufacturing.

Key Words : hyaluronic acid, chitosan, environment-friendly

I. Introduction

In the past, in order to increase the value of a textile product the fabric's indigenous property were maintained or improved to make up for shortcoming of the material. Currently[1)] we are

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becoming more intimate with the environment. We are using more environmentally safe products in the clothing industry and awareness of the environment in spreading fast. Also, it is becoming more important to produce environmentally improved textile products (EITP)[2].

Though the terminology "environment-friendly" is increasing rapidly like a flood the application for the research in designing materials that are already existing in the development[3)4)5] of utilizing the fabrics in the fashion industry are mostly assessed by the research[6)7)8)9)10] in the reactions of the consumer. In the clothing industry research is in the early stages for environment-friendly products. In material manufacturing experiments the vitality of consumption is being marketed from the clothing industry and is in the state of extended research.

According to general research they are trying to find a concept that is a healthier function to satisfy a public process involving hyaluronic acid and chitosan to fit the ecology trend in cotton, silk, and ramie fabric manufacturing. Surveys were taken to analyze the consumers' awareness and behavior towards preferred manufactured materials.

Researchers are trying to grasp the consumers' flow of the fashion industry by following the consumers' awareness for the environmental demands according to their predictions on their decisions through the development of materials.

II. Theoretical Background

1. Environment-friendly products and consumers

The definition of environment-friendly is 'goods and services, laws, guidelines and policies considered to inflict minimal or no harm on the environment'. Environment-friendly products are also known as 'green products' and 'eco-friendly products'.[11] 'Environmental consideration' has two different meanings. One meaning would be the contamination of the environment by products through the production process. Another would be contamination of the environment by products already manufactured.[12]

Even though many studies have different definitions for an eco-friendly product, the precision of the concept is consistent. In the clothing industry a eco-friendly product is made up of three levels: manufacturing, consumption, and disposal.[13] With these levels the concept of a friendly environment is practiced. In other words, in the stages of textile manufacturing clothing production, sales, and even the termination of the clothes are all the areas that apply throughout the concept.

Recent developments regarding environment-friendly products are becoming known more worldwide. Especially in 2009, the UN decided to make sea routes in regions where each country can access natural fibers as incentive for material development. For example, in Europe they made a environmental policy to reduce the emission of carbon. From a sustainable marketing point of view, the recycling of textile materials. Also, they are continuing development for spontaneous decomposition functionality for textiles. In America, it is increasingly becoming a trend to use organic cotton, soy, bamboo, corn, and other raw materials to preserve the environment. In addition, China's middle and upper class population are gradually consuming more products that are safe for the environment. Corn, bamboo, organic cotton and etc. are only

some materials that are briskly improving the development of environmentally-friendly materials that are vital.

In Korea they are going by Green motto, saying, "Be friendly to the environment, promote green growth, and reduce energy!" They are also setting a trend to preserve and proliferate natural textiles and materials. Not only are they concerned with Industrial textiles and the development of materials safe for the environment but they are also preparing a foundation to increase techniques for industrial textiles and production of "green" products. Development of eco-friendly variety of materials such as soy, bamboo, ginkgo trees, chitosan, marine plants, milk, green tea, corn, and etc. are in production. In the Korean clothing industry organic cotton, Tencel, and bamboo materials are being utilized in a variety of ways.[14]

However, even with all the developments with the concerns of the environment in Korea environmentally-friendly products are not a vital part of the peoples' lifestyle. The most important concern is not just having people buy environment-friendly products but for the people to be aware and grasp the vitality of being environmentally friendly and to develop more products and ideas to improve the environment.

2. Environment-friendly products and the actions of the consumer

In the meantime, the heightening of social interest in the environment is essential to influence the gradually increasing interest in environment-friendly products. The personal variables of consumer behavior should not only include environment-friendly products but the awareness, knowledge, and the consciousness of the environment for the economic society as a whole.

A demographic characteristic and related environmental consumer research shows the statistics that gender and age variables were similar. For example, several studies[15] have shown that younger age groups support reformation rather than demand institutional change and social order. Whereas results[16] for older age groups show more interest and support for environmentally friendly products.

Studies show that there is a correlation between the behavior of consumption of environment-friendly products and the focus on variables of environmental knowledge, interest, and consciousness. A person's personal preference sets focus on these variables. If you look at similar studies you will find these results.

The first variable is associated with environmental knowledge. It is explained that environmental knowledge is related with the understanding of the environmental issues.[17] The more environmental knowledge one has it shows active responsible behavior towards the betterment of the environment. For instance, people who have more knowledge about the environment tend to act more upon their environmental duties, like recycling, than those who are less aware about the environment. Therefore, environmental knowledge creates a better attitude for environmental consciousness and people aim to practice a sensible reaction toward the improvement of the environment. Whereas if you have a lack of environmental knowledge, it would be harder to understand and carry out duties to improve the environment.

Environmental concern means to give attention and comprehend[18] the serious problems and realize the importance of the environment. This gradually increases the responsibilities of the consumer.[19] According to research done by Park Yongbong and Kim Sangwoo[20] if you have more

concern for the environment, you realize the importance of the products you use and its effects on the environment. The consumer group that has higher concerns for the environment have more positive attitudes toward environment-friendly products. Furthermore, research by Yoon Sungwook[21] suggests that a deciding variable for consumers who buy environment-friendly products depend on the consumer's perception and their knowledge of the importance of concerns of the environment. Surveys that target college students show that environmental knowledge and interest is what influences them to purchase goods that are environmentally friendly. Other studies show that by educating targeted consumers that have less knowledge about the environment increases the scale of them entering into the environmental consumer market.

Environmental consciousness is the reduction of behaviors that induce environmental problems to continue the progression of humanity and to have interest in the influence environment friendly idea.[22] Environmental consciousness is known to make consumers have a more positive outlook on being influenced by the environment and be friendly to the environment.

Finally, by being environmentally friendly it will be a continuation to preserve the environment. By conserving resources and satisfying one's needs by buying and using products that do not induce more harm to our environment. This understanding will be the key in disposing current and future environmental problems.[23]

All in all, a consumer's environmental knowledge, environmental concern, environmental consciousness, and the action of being environmentally friendly are all influenced by a variety of research and the performance of consumer, and choices and relationships they make regarding the environment.

3. Eco-friendly clothing products and the consumer

Since the consumption of environmentally friendly textile goods are not as vital yet, there are only a few researches done on the production of environmentally friendly textile goods. Generally the consumer's interest of the environmentally friendly products are increasing the intent of the sales on those products.[24] Furthermore, clothing brands that put emphasis on the concept of a friendly environment have a better consumer crowd compared to the clothing brands that do not have a friendly outlook on the environment.[25] Besides, studies are showing that consumers consider the quality of an environmentally friendly product is more important than the price of the product.[26] If you look at the characteristics of the demographic research[27] it will show that there was a strong correlation between those that have a higher education and higher income have more interest in environmentally friendly clothing products. Whereas results show that younger consumers in their 20s and 30s did not have much interest in environmentally friendly clothing products.

Research conducted by Chun Jongsook and Song Hyunok[28] revealed that apparel companies are using 9 different kinds of materials that have the environmentally friendly quality, like domestic fibers, and the subjects targeted were consumers and clothing business professionals. The results of their research show that compared to the clothing business professionals, general consumers have a greater intention of buying products made from red clay or charcoal textiles rather than Tencel, organic cotton, and bamboo textiles like clothing business professionals. Studies show that respondents

that have experience in the consumption of eco-friendly products have a greater awareness and reliability towards the products than those who have not consumed products that are eco-friendly. Even though studies have shown that consumers in the age groups of 40s and 50s have a lower awareness for environment-friendly materials they have a better understanding of the health benefits and reliability of environment friendly products than those in the in the age groups of 20s and 30s. On the other hand respondents in their 20s and 30s show they have great environmental affinity and awareness for eco-friendly textile materials and health functions.

As mentioned earlier, even though the use of eco-friendly materials are escalating in many foreign countries there is a lack of vitality on the consumption of environmentally friendly materials used for clothing. Therefore, it seems like more active research is needed to increase the consumption of eco-friendly materials in clothing products. To do this researchers must assess the consumer's response to eco-friendly clothing material, as well as, eco-friendly clothing products.

III. Research Method

First, researchers looked for how well aware consumers were with there knowledge of the environment and their attitude towards it. They also analyzed the different variables between consumers, that buy eco-friendly goods and those who do not buy such goods, that influence the consumers intent on buying eco-friendly products.

Second, a focal point was set to see how different the outcome was when six different processing methods were used and to see the consumer's evaluation considering the type of method. In relationship to this, a detailed description of the context is laid out in the following.

1. Environmental awareness and attitude related to research issues

Issue 1. Research the variables (environmental knowledge, environmental interest, environmental consciousness, friendly environmental behavior, the importance of awareness, and intent of consumption) to see if there is a correlation to the environment.

Issue 2. Exploring the variables (environmental knowledge, environmental interest, environmental consciousness, friendly environmental behavior, the importance of awareness, and intent of consumption) that determine the differences in the consumers who buy environmentally friendly products and environmentally friendly materials and the consumers that do not purchase environmentally friendly products.

Issue 3. Studying the variables (environmental knowledge, environmental interest, environmental consciousness, friendly environmental behavior, the importance of awareness, and intent of consumption) that effect a consumer by gender.

Issue 4. Research on the variables that influence the consumption of environmentally friendly products.

2. Issues concerning processing methods and relating materials

Issue 5. Investigate the contrast of the consumer's consumption intent by using six distinctive processing methods[*] and three different materials (cotton, silk, ramie fabric).

Issue 6. Analyze the consumer's understanding of the six distinctive processing methods and

the use of three different materials (cotton, silk, ramie fabric) with a detailed assessment.

* 1 = control

  2 = 1% low molecular hyaluronic acid

  3 = 1% high molecular hyaluronic acid

  4 = 1% chitosan

  5 = 1% low molecular hyaluronic acid + 1% chitosan

  6 = 0.1% high molecular hyaluronic acid + 0.1% chitosan

3. Measuring tools and data analysis

Questionnaires involving the research issues from above are separated into two parts and the measuring tools used for the research is detailed in the following.

The first part of the questionnaire entails questions regarding environmental awareness and behavior. It also includes questions concerning environmental knowledge, environmental interest, environmental consciousness, environmental issues. The questionnaire consisted of two questions about environmental knowledge from Said et al.[29], four questions about environmental interest from Ellen et al.[30], five questions from Minton & Rose[31], and eleven questions from Min Hyunsun[32] about environmental issues.

In the second part of the questionnaire consisted of 12 questions (this material feels rustly, If this material had health benefits I would like to purchase them.) about the processing methods and the materials used to find out the consumer's perception of the methods and materials. The three materials (cotton, silk, and ramie fabric) were selected because all three have a human-friendly attributes and are currently receiving the spotlight as it sets an ecological trend. To put in artificial dyes and artificial finishing agents make the textiles more easier to handle. Also, to increase utilization to the maximum skin-care manufacturers consider materials that make the most skin contact. Hyaluronic acid and chitosan were selected to see if it could improve health benefits to the human body while used in the processing of the textiles. To increase the effectiveness of the process hyaluronic acid and chitosan were combined. Hyaluronic acid is used to revitalized oxygen removal, supplement, and resist allergies. Chitosan treatment is used to resist allegies and is known to be an effective anti-bacterial and anti-viral. Thus the six processing methods were utilized for the survey. All in all, the surveys used for the research were composed of questions that measured 7 points.

For data analysis, descriptive statistics Pearson's correlations, Cronbach's alpha, t-test, ANOVA, and Duncan tests were employed.

4. Gathering data and characteristics of the targeted subjects

The target subjects that participated in the research were men and women in college and graduate school. Through 50 parts of a preliminary survey individual questions were compiled for a final survey for better understanding and accuracy. For the total analysis 328 surveys were used out of 336. Out of the 336 surveys eight of them were not used due to insincerity to the research. In the research the targeted subjects participated in a survey which consisted of the three materials, then separated into three groups (cotton = 107, silk = 117, ramie fabric = 110). After the groups were split they had to respond to questions about the 6 different processing methods used on that material.

Results show that 108 subjects (32.9%) were consumers of environmentally friendly products and 56 subjects (17.1%) were consumers of

environmentally friendly clothing products. The eco-friendly products consumed by the subjects include: food, detergent, cosmetics, The Body Shop cosmetics, feminine products, stationary, and etc. Out of the eco-friendly clothing products consumed by the subjects include: t-shirts, baby clothes, bags, underwear, dresses, jeans, and etc.

IV. Results and Consideration

1. Reliability of environmental variables

To test the reliability of the variables used in the research the value of Cronbach's α was calculated. The results show that among environmental knowledge, environmental interest, friendly behavior towards environmental products, the importance of environmental awareness, and intent of consumption Cronbach's α was calculated to .67 – .85 which was high in intristic reliability in the measured variables.

2. Correlation in environmental variables

To investigate the relationship of the individual composition variables the correlation analysis was implemented. The results from <Table 1> suggest a correlation of environmental knowledge, environmental interest, consciousness of environmental problems, behavior friendly to the environment, and intent of consumption. In other words, the higher a consumer's attention towards environmental knowledge, interest, and concern for the environment the more conscious the consumer is in knowing the importance of the environment, hence, increasing consumption in eco-friendly products.

3. Difference in variables in groups analysis

1) Difference in variables among purchase groups of environmental friendly products

Next we used the t-test to see what kind of awareness shows a difference in the consumers who buy eco-friendly products and the non-consumers as environmental variables. These results are displayed on <Table 2>. Generally, from all the variables you can see that consumers that have a greater knowledge about the environment and interest had a higher percentage of buying products that influence a

<Table 1> Correlation of Variables.

	Environmental Knowledge	Environmental Interest	Environmental Concern	Environment Friendly Behavior	Intent of Consumption
Environmental Knowledge	1	–	–	–	–
Environmental Interest	0.234***	1	–	–	–
Environmental Concern	0.316***	0.384***	1	–	–
Environment Friendly Behavior	0.206***	0.280***	0.459***	1	–
Intent of Consumption	0.372***	0.270***	0.568***	0.453***	1

p***<.0001

<Table 2> Difference in variables among purchase groups of environmental friendly products.

Variables	Consumer (N=108)		Non-consumer (N=220)		t-value
	average	error	average	error	
Environmental Knowledge	3.90	1.01	3.63	1.13	2.09*
Environmental Interest	5.65	0.89	5.38	0.90	2.52*
Concern for Environmental Issues	4.44	1.04	4.25	1.06	1.48
Awareness of the Importance of Environmentally Friendly Behavior	5.45	0.84	5.36	0.77	0.95
Intent of Consumption of Eco-friendly Products	4.67	0.94	4.19	0.89	4.45***

*p<.05, **p<.01, ***p<.001

<Table 3> Difference in variables among purchase groups of environmental friendly clothing products.

Variables	Consumer (N=56)		Non-Consumer (N=272)		t-value
	average	error	average	error	
Environmental Knowledge	4.00	0.9	3.67	1.13	2.09*
Environmental Interest	5.65	0.89	5.47	0.91	0.23
Concern for Environmental Issues	4.58	1.00	4.26	1.06	2.10*
Awareness of the Importance of Environmentally Friendly Behavior	5.47	0.82	5.37	0.79	0.85
Intent of Consumption of Eco-friendly Products	4.87	0.87	4.24	0.91	4.75***

*p<.05, ***p<.001

healthier environment than the non-consumers. As a result the more educated a consumer is about the environment they are more subject to purchase environment-friendly products.

2) Difference in variables among purchase groups of environmental friendly clothing products.

The final analysis show that there is a difference between a consumer that has purchased an environmentally friendly clothing product and a consumer that did not. It was shown that consumers that purchased an environmentally friendly clothing product had a more higher pointage than non-consumers in environmental knowledge, concerns for the environment, and intent to consume eco-friendly products. There was a distinctive gap between the two groups because of the level of environmental knowledge the consumers who have purchased goods that are environmentally friendly.

3) Difference in variables according to gender

Next, we test the dinference in variables between men and women. Even though there was no concrete consistency in the experience of the research between environmental concern or behavior and the gender of a subject, the majority of studies show that women showed more interest and concerned with the environment than men.

With the exception of environmental knowledge other variables show that female students had a higher score than male students. Female students showed the most difference especially in the concern for the environment and the purchasing of eco-friendly products. In conclusion, results from the preceding study[26)~31)] support that the female students had a higher understanding of the importance and interest for the welfare of the environment which lead to a higher consumption of eco-friendly products.

4. Variables that affect the intention of purchasing environmentally friendly products

To research the variables that influence the intention of purchasing environmentally friendly products age, environmental knowledge, environmental interest, and the importance of a friendly environmental behavior were used as the independent variable (IV). The intention of purchasing products was used as the dependent variable (DV). With both the independent and dependent variables a multiple regression analysis was implemented. The results from this analysis show that the most influential variable that made consumers buy products that were eco-friendly was environmental concern. Following environmental concern was importance of a friendly environmental behavior and environmental knowledge, respectively (R^2=.40). In other words, the more concerned you are with the environment, the more you act on the importance of a friendly environment, and the more knowledge you have about the environment and its state, the intention to purchase eco-friendly products will increase.

5. Six types of processing methods and materials (cotton, silk, ramie fabric) that influence the intention of purchasing environmentally friendly products

<Table 4> Difference in variables according to gender.

Variables	Male (N=162)		Female (N=162)		t-value
	average	error	average	error	
Environmental Knowledge	3.81	1.18	3.63	1.01	1.47
Environmental Interest	5.37	0.93	5.57	0.86	−2.06*
Concern for Environmental Issues	4.21	1.13	4.42	0.95	−1.77
Awareness of the Importance of Environmentally Friendly Behavior	5.37	0.87	5.41	0.71	−0.53
Intent of Consumption of Eco-friendly Products	4.22	0.95	4.48	0.90	−2.62**

<Table 5> Variables that affect the intention of purchasing environmental friendly products.

DV	IV	β	t-value	R^2	F
intention of purchasing	environmental concern	.401***	8.035	.40	73.41***
	importance of a friendly environmental behavior	.228***	4.711		
	environmental knowledge	.198***	4.374		

***p<.0001

1) The intention of purchasing environmentally friendly products depending on the processing methods

By using the six types of processing methods and the materials (cotton, silk, ramie fabric) that influence the intention of purchasing environmentally friendly products, the research results show that the t-value in the silk (4.81) and cotton (4.49) materials had a higher value without processing. The use of hyaluronic acid did not have a great impact on the three different type of materials. The results from using the hyaluronic acid process, cotton had the most influence on the intention of purchase. Next was silk, then ramie fabric respectively. As a result of using the chitosan treatment, cotton was again had the most influence on the intention of purchase. In second was silk then ramie fabric respectively again. The use of low molecular hyaluronic acid and chitosan treatment processes combined showed that cotton (4.32) and silk (4.17) had the highest impact from this process. Lastly, results showed that cotton (5.05) and silk (4.96) had the most influence from using the combination of 0.1% high molecular hyaluronic acid and chitosan treatment process.

2) The intention of purchasing health functional materials depending on the processing methods.

Research was done to find out the intention of purchasing caused by health functions from the three materials and six processing methods. The results are as followed: In the controlled processing method it showed that cotton (4.72) and silk (4.45) had the most influence. By using the chitosan treatment silk showed the most intent for purchasing, then cotton, and last ramie respectively. With the low molecular hyaluronic acid + chitosan combination process cotton (4.24) and silk (4.22) had a greater impact on purchasing. Finally, in the 0.1% high molecular hyaluronic acid + chitosan combination process cotton had the most influence on purchases. Following cotton was silk and ramie respectiviely. However, in the low molecular hyaluronic acid + chitosan combination and the 0.1% high molecular hyaluronic acid + chitosan combination processes it was shown that there was no change in the health functions of the three subject materials.

<Table 6> The intention of purchasing environmental friendly products depending on the processing methods.

Process type \ Material type	material 1 (cotton)	material 2 (silk)	material 3 (ramie)	F
Control	4.49^a	4.81^a	4.01^b	11.747***
low molecular hyaluronic acid	3.80	3.82	3.65	0.531
high molecular hyaluronic acid	4.03^a	3.89^b	3.61^b	2.898*
chitosan	4.15^a	3.79^b	3.36^c	10.615***
low molecular hyaluronic acid + chitosan combination	4.32^a	4.17^a	3.60^b	9.564***
0.1% high molecular hyaluronic acid + chitosan combination	5.05^a	4.96^a	4.04^b	18.525***

p**<.01, p***<.001, a,b,c=Duncan Test

3) The intention of purchasing clothing manufactured using materials with different processing methods.

By using the six types of processing Six types of processing methods and materials (cotton, silk, ramie fabric) that influence the intention of purchasing environmentally friendly clothing products resulted in the silk (4.26) and cotton (4.12) materials having a higher value without processing. When the chitosan treatment process was used silk (3.70) and cotton (3.52) had the highest impact here also. The results from using the low molecular hyaluronic acid + chitosan combination process displayed that the

silk (4.00) had the highest impact and cotton (3.97) came in second and ramie fabric did not even make it on the chart. And lastly, for the 0.1% high molecular hyaluronic acid + chitosan combination process cotton (4.79) had the highest influence, then silk (4.68). But when the low molecular hyaluronic acid + chitosan combination process was used no other distinction was seen between the material types.

Out of all the different types of process methods the low molecular hyaluronic acid + chitosan combination process had minimal to no impact on the intent of purchase.

To find the appropriate process for the materials

<Table 7> The intention of purchasing health functional materials depending on the processing methods.

Process type \ Material type	material 1 (cotton)	material 2 (silk)	material 3 (ramie)	F
Control	4.45^a	4.72^a	4.05^b	7.43**
Low molecular hyaluronic acid	3.78	3.76	3.60	0.55
High molecular hyaluronic acid	3.97	3.88	3.64	1.93
Chitosan	3.79^b	4.06^a	3.46^c	6.17**
Low molecular hyaluronic acid + chitosan combination	4.24^a	4.22^a	3.77^b	4.83**
0.1% high molecular hyaluronic acid + 0.1% chitosan combination	5.06^a	4.87^a	3.93^b	21.82***

*p<.05, p**<.01, p***<.001, a,b,c=Duncan Test

<Table 8> The intention of purchasing clothing manufactured using materials with different processing methods.

Process type \ Material type	material 1 (cotton)	material 2 (silk)	material 3 (ramie)	F
Control	4.12^a	4.26^a	3.27^b	18.37***
low molecular hyaluronic acid	3.490	3.42	3.20	1.45
high molecular hyaluronic acid	3.77^a	3.54^a	3.13^b	6.53**
chitosan	3.52^a	3.70^a	2.91^b	11.63***
low molecular hyaluronic acid + chitosan combination	3.97^a	4.00^a	3.20^b	13.07***
0.1% high molecular hyaluronic acid + 0.1% chitosan combination	4.79^a	4.68^a	3.73^b	19.44***

*p<.05, p**<.01, p***<.001, a,b,c=Duncan Test

so that the consumer's intent to purchase products is individualized may result in information to be misused.

6. Consumer's perception of the hyaluronic acid and chitosan treated in the three chosen fabrics

1) Cotton material

First, the consumer's evaluation of the processed cotton was analyzed. The results are displayed on <Table 9>.

Process 6 (0.1% high molecular hyaluronic acid + 0.1% chitosan combination process) averaged the highest level of softness out of all the others. Whereas, Process 2 (low molecular hyaluronic acid + chitosan combination process) had the lowest average.

In the category of 'rustly'ness the low molecular hyaluronic acid + chitosan combination process the Process 2 had the highest price so the rustly feeling was the strongest.

More than the unprocessed control, process 6, 0.1% high molecular hyaluronic acid + 0.1% chitosan combination process, had the most moist feeling. Out of the 'feeling' categories like 'softness', 'moist', and 'feels good' the 0.1% high molecular hyaluronic acid + 0.1% chitosan combination process (process 6) showed the highest reaction and process 2, the low molecular hyaluronic acid process had the lowest reaction. Out of all the categories for process 2, the low molecular hyaluronic acid process, the 'rustly' feeling had the highest results. As you may see from <Table 9> you can see that the concentrated 0.1% high molecular hyaluronic acid + chitosan combination process, which the treatment ratio as 1:1, showed the lowest reaction to process 6 and

had the same results for the 4 categories on top.

From the categories: 'good quality', 'looks expensive', and 'I am fond of it' resulted highest in price with process 6. Also, from the categories: 'I want to wear clothes made from this material', 'I intend on buying this for the health functions', 'Intent of buying because it is environmentally friendly', and Intent on buying if this material is used to make clothing' results show that process 6 had the highest influence on intentions to purchase products.

Regardless of the processing method consumers prefer the 0.1% high molecular hyaluronic acid + chitosan combination process rather than 1%. But further research should be done to concentrate on the processing the consumer demands.

2) Silk material

Next, the consumer's evaluation of the processed silk was analyzed. The results are displayed on <Table 10>. Naturally the silk material has a very soft and draping feeling.[33] As the KES-FB study shows that the silk material actually has a very stiff feeling after it has been processed. From the subjective evaluation the category 'softness' had the highest price with process 6 and the next highest was the untreated material. The table shows that materials using the 1% concentrated processing had a very low price and the softness was less. It was shown that consumers that a more positive feel for the silk material that was processed with the low molecular hyaluronic acid + chitosan combination process rather than with the low molecular hyaluronic acid itself. Like the cotton material, the silk material had the best price results with process 2 and the low molecular hyaluronic acid process

<Table 9> Consumer's perception of the hyaluronic acid and chitosan treated in cotton fabrics.

	1	2	3	4	5	6
	avg.(SD)	avg.(SD)	avg.(SD)	avg.(SD)	avg.(SD)	avg.(SD)
soft	4.570 (1.512)	3.224 (1.410)	3.851 (1.459)	3.654 (1.512)	4.065 (1.376)	5.458 (1.176)
rustly	3.374 (1.512)	4.542 (1.410)	4.103 (1.459)	4.159 (1.382)	3.935 (1.369)	2.860 (1.390)
moist	3.701 (1.512)	2.925 (1.410)	3.393 (1.459)	3.365 (1.193)	3.757 (1.156)	4.710 (1.318)
feels good	4.187 (1.512)	3.196 (1.410)	3.664 (1.459)	3.551 (1.215)	4.009 (1.128)	5.131 (1.260)
good quality	3.832 (1.512)	3.383 (1.410)	3.673 (1.459)	3.589 (1.251)	3.879 (1.179)	4.916 1.297)
looks expensive	3.449 (1.512)	3.187 (1.410)	3.551 (1.459)	3.505 (1.193)	3.766 (1.138)	4.785 1.267)
I am fond of it	4.019 (1.512)	3.299 (1.410)	3.654 (1.459)	3.626 (1.209)	3.860 (1.240)	4.916 1.290)
I think i'll like it	3.869 (1.512)	3.243 (1.410)	3.626 (1.459)	3.430 (1.245)	3.925 (1.249)	4.776 1.341)
I want to wear clothes made from this material	4.019 (1.512)	3.383 (1.410)	3.720 (1.459)	3.589 (1.310)	3.972 (1.224)	4.841 1.347)
I intend on buying this for the health functions	4.449 (1.512)	3.776 (1.410)	3.972 (1.459)	3.785 (1.174)	4.224 (1.200)	5.056 1.359)
Intent of buying because it is environmentally friendly	4.486 (1.512)	3.804 (1.410)	4.028 (1.459)	3.785 (1.267)	4.168 (1.255)	5.047 1.390)
Intent on buying if this material is used to make clothing	4.122 (1.512)	3.486 (1.410)	3.766 (1.459)	3.523 (1.320)	3.972 (1.270)	4.785 1.401)

had the highest results with the 'rustly' category and was most suitable for it.

In the categories: 'moist' and 'feels good' process 6 prevailed with the highest price and showed similar results with that of the cotton material.

Also, like the cotton material, the silk material had the highest results in 'I want to wear clothes made from this material', 'I intend on buying this for the health functions', 'Intent of buying because it is environmentally friendly', and Intent on buying if this material is used to make clothing' with process 6.

According to the study, overall, process 6 had the most preferred likability and price for the consumers. This will help us concentrate and predict the best processing method for the consumers.

3) Ramie fabric

Last but not least, the consumer's evaluation of the processed silk was analyzed. The results are displayed on <Table 11>.

Ramie fabric is a material that is orginally not soft. In fact, it has a tendency to be easily broken. It was predicted that ramie fabric results

<Table 10> Consumer's perception of the hyaluronic acid and chitosan treated in silk fabrics.

	1	2	3	4	5	6
	avg.(SD)	avg.(SD)	avg.(SD)	avg.(SD)	avg.(SD)	avg.(SD)
soft	5.090 (1.512)	3.270 (1.410)	3.505 (1.459)	3.820 (1.422)	4.216 (1.534)	5.487 (1.197)
rustly	3.460 (1.512)	4.829 (1.410)	4.559 (1.459)	4.387 (1.200)	3.874 (1.287)	3.072 (1.305)
moist	3.955 (1.512)	3.153 (1.410)	3.216 (1.459)	3.324 (1.315)	3.802 (1.439)	4.775 (1.333)
feels good	4.730 (1.512)	3.306 (1.410)	3.451 (1.459)	3.685 (1.388)	4.117 (1.380)	5.144 (1.190)
good quality	4.369 (1.512)	3.405 (1.410)	3.532 (1.459)	3.838 (1.418)	4.144 (1.374)	4.901 (1.368)
looks expensive	4.117 (1.512)	3.270 (1.410)	3.649 (1.459)	3.802 (1.394)	3.946 (1.278)	4.784 (1.344)
I am fond of it	4.261 (1.512)	3.189 (1.410)	3.478 (1.459)	3.694 (1.387)	4.090 (1.365)	4.883 (1.312)
I think i'll like it	4.189 (1.512)	3.198 (1.410)	3.423 (1.459)	3.604 (1.281)	3.919 (1.315)	4.748 (1.358)
I want to wear clothes made from this material	4.045 (1.512)	3.216 (1.410)	3.423 (1.459)	2.982 (1.173)	3.273 (1.263)	3.664 (1.377)
I intend on buying this for the health benefits	4.721 (1.512)	3.757 (1.410)	3.883 (1.459)	4.063 (1.370)	4.243 (1.274)	4.865 (1.311)
Intent of buying because it is environmentally friendly	4.811 (1.512)	3.820 (1.410)	3.892 (1.459)	4.153 (1.295)	4.324 (1.287)	4.964 (1.228)
Intent on buying if this material is used to make clothing	4.261 (1.512)	3.423 (1.410)	3.541 (1.459)	3.703 (1.339)	4.000 (1.388)	4.685 (1.375)

of softness would be completely different from the cotton and silk material but it actually had the highest price in the 'softness' category with process 6. So it was concluded that process 6 (0.1% high molecular hyaluronic acid + chitosan combination process) had the most influence in make all three of the materials soft. For 'rustly'ness of the material the low molecular hyaluronic acid process (process 2) did the job, just like the cotton and silk materials.

In the categories of 'moist' and 'feels good' process 6 made the most impact on the price. With these results, it was concluded that all three materials had similar results with process 6.

Lastly, in the categories of 'I want to wear clothes made from this material', 'Intent of buying because it is environmentally friendly', and Intent on buying if this material is used to make clothing' ramie fabric had the same response as those of the cotton and silk materials with process 6. But surprisingly, with the ramie fabric, the unprocessed process had the highest ratings for the category, 'I intend on buying this for the health functions'. Results show that consumers in their 20s and 30s expect more material options for the health functionality in materials.

<Table 11> Consumer's perception of the hyaluronic acid and chitosan treated ramie fabrics.

	1	2	3	4	5	6
	avg.(SD)	avg.(SD)	avg.(SD)	avg.(SD)	avg.(SD)	avg.(SD)
soft	3.400 (1.512)	2.736 (1.410)	3.091 (1.459)	2.855 (1.340)	3.500 (1.507)	4.391 (1.497)
rustly	4.427 (1.512)	4.736 (1.410)	4.409 (1.459)	4.555 (1.444)	4.227 (1.412)	3.573 (1.358)
moist	2.800 (1.512)	2.673 (1.410)	3.018 (1.459)	2.891 (1.222)	3.500 (4.113)	4.227 (3.100)
feels good	3.446 (1.512)	3.009 (1.410)	3.255 (1.459)	3.391 (4.107)	3.627 (2.205)	4.100 (1.407)
good quality	3.191 (1.512)	3.318 (1.410)	3.373 (1.459)	3.282 (1.220)	3.455 (1.318)	3.927 (1.425)
looks expensive	2.955 (1.512)	3.309 (1.410)	3.327 (1.459)	3.218 (1.244)	3.291 (1.336)	3.718 (1.415)
I am fond of it	3.291 (1.512)	3.191 (1.410)	3.200 (1.459)	3.546 (4.083)	3.273 (1.299)	3.928 (1.386)
I think i'll like it	3.200 (1.512)	3.118 (1.410)	3.082 (1.459)	3.073 (1.224)	3.273 (1.233)	3.709 (1.397)
I want to wear clothes made from this material	3.127 (1.512)	3.036 (1.410)	3.055 (1.459)	2.982 (1.173)	3.273 (1.263)	3.664 (1.377)
I intend on buying this for the health benefits	4.046 (1.512)	3.600 (1.410)	3.636 (1.459)	3.464 (1.254)	3.773 (1.332)	3.927 (1.386)
Intent of buying because it is environmentally friendly	4.009 (1.512)	3.655 (1.410)	3.609 (1.459)	3.364 (1.261)	3.600 (1.335)	4.036 (1.465)
Intent on buying if this material is used to make clothing	3.273 (1.512)	3.200 (1.410)	3.127 (1.459)	2.909 (1.177)	3.200 (1.284)	3.727 (1.381)

If consumers prefer the 'rustly' feeling of a material at least 1% of processing is required. But generally, in the age groups of the 20s and 30s consumers prefer the feel of a material has less than 1% processing. Even though the general preference resulting from the analysis reveals that 0.1% of concentrated processing was preferred, consumers prefer to concentrate on something other than the analysis.

V. Conclusion

Recently, an important trend in the clothing material is the environment friendly characteristic which considers processing as a high value. A part of the development of materials that have a human-friendly function is the treatment with original and natural materials, hyaluronic acid and chitosan, in textile materials like, cotton, silk, and ramie fabric materials. The following conclusion was made from the results of a survey including the consumers consciousness and behavior towards the environment and their preference towards materials and the processing methods.

1. Results from a survey taken by targeted consumers in the 20s and 30s age group showed that the greater environmental knowledge, environmental interest, and concern for the

environment you have the greater the consumer considers the importance of the behaviors that conserve the environment. By this, consumers are more interested in the products that are environmentally friendly and it increases their intentions on purchasing eco-friendly products. Generally it was shown that women have a higher interest in the importance of environmental issues.

2. Most consumers in their 20s and 30s showed that they prefer the feel of the materials after they have been processed at least at 1%. To increase the 'rustly' feeling in the materials results show that a concentrated processing of at least 1% is needed to become "suitable".

3. Because hyaluronic acid and chitosan is an expensive textile processing method, the clothing industry is considering applying a unit cost. During the experiments 1% of concentrate was processed, but more than 1% concentrated processing, 0.1% of concetrated processing results show that it is a more preferred method for the consumers. However, when the preferred feel of the material is 'rustly', then consumers in their 20s and 30s revealed that they would prefer a less than 1% concentrated processed material rather than what you would usually need, which is at least 1%. To create a better environment-friendly material the most suitable method would be one that is less than 1% concentrated processing.

In conclusion, it was speculated that because of the lack in diversity of the consumers and since we did not use a variety of concentration on the processing methods the consumers did not have a wide range to choose their preference from. In latter studies a variety of concentrated processing will be used. For example, research that includes less than a 1% concentrated processing method. This way the consumers will have a wide variety of choices to make their preference and results will be even more accurate.

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