

An Analysis of the Ecology Fabric Trend : 20 Years (1986-2005) of S/S Woven Fabric Trends

An analysis of
the ecology
fabric trend

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Abstract *In order to provide more systematic approach to analyze fabric trends and to develop fabrics accordingly, ecology fabric trend from 1986 to 2005 was analyzed related with fabric trend themes and fabric attributes. The result shows that in the 1980s, natural theme appeared, followed by primitive theme and imitated natural theme until the mid 1990s. From the late 1990s to the early 2000s, new natural theme appeared, followed by eco-friendly theme, and then recycling theme. In the natural theme, 'clean' was the most important fabric attribute and 'textured' and 'worn' were important fabric attributes in the primitive theme. In the imitated natural theme, 'wet' fabric attribute was preferred. In the new natural theme, 'lightweight' were preferred. The results of this study empirically demonstrated that abstract and ambiguous trend terms can be interpreted with a physical, substantial, and feasible attributes that fabric practitioners can easily understand.*

Key words *fabric trend; ecology; natural; eco-friendly; primitive; trend forecast*

Introduction

The ecology trends in fabric started in the mid 1980s at the Premiere Vision, the largest fabric exhibition in the world, where discussion was made on the use of natural fibers for the conservation of nature emphasizing the use of natural fiber with colors of natural tone. The fabric exhibition Expofil held in 1989 proposed the fashion trend of 1990 and 1991 titled "Going Green", which reflects the interest on the conservation of earth (David, 2004). Especially, Promostyl, a fashion trend forecasting agency, published the "Ecostyl" since 1992, concentrating on ecology in woven fabrics and making studies on the problems in ecology (Han & Kim, 1999). Such interest in ecology affected the fabric industry. For example, Novotex, a Danish manufacturer, developed 'Green Cotton' that is made with the minimal use of chemical additives. The company used a complex purification and monitoring system and successfully minimized the possible pollution in the entire finishing process ('Ecology-minded labels', 2007). Moreover, a life cycle model has been developed for cotton products with the statement about the environmental effects that rise in each phase of the life cycle model (Chun, 2004).

Fabrics are selected first when the theme of the fashion is decided, and are one of the most important factors considered by customers when making a decision to purchase a product. At the fabric

trend forecasting stage, a fabric is developed to suit the coming fashion trend. This stage initiates the first process in the fashion products' value chain. To obtain right and highly relevant information on the changes in fabric trends is the most important thing in forecasting in advance (Park & Kim, 2004). Despite such importance of fabric forecasting and developing, so much attention has been paid to concepts, colors, and style trends of the finished fashion products. And from the fabric developer's point of view, description on fabric trends is generally made using unfamiliar terminology (S. Kim, 2004).

Also, previous studies on fashion trends have rarely concentrated on fabrics (Chung & Geum, 2005; Ha & Kim, 1993; Kim & Kim, 2006; Lee & Jeon, 1998; Nam & Kim, 2001). Compared to fashion style trend, it is hard to find a more systematic and advanced database that can be widely used for fabric planning. Therefore, this study is intended to establish a basis for building a database on fabric trends that can provide useful information for fabric planning. For this purpose, this study selected one macro trend theme, 'Ecology.' Our specific research questions are first, to identify and categorize the sub-themes of the trend, to analyze chronological changes of the themes for 20 years, and to examine the relationships between fabric attributes and the fabric trend themes.

Research Methodology

Research sources for content analysis

For analysis, we decided to collect Spring and Summer(S/S) fabric trends from 1986 to 2005 from two reputational magazines, *Textile View* and *International Textiles*. We rested on *Textile View* (vol. 01-vol. 68) for information from 1989 to 2005, and on *International Textiles* (vol.650-vol. 676,) from 1986 to 1988. For analysis on ecology fabric trend in this research, we selected the articles titled 'Forecast: Fabric summer', 'Women's wear fabrics: Summer', 'Men's wear fabrics: Summer', 'Fabric re-think: Summer', and 'Premiere Vision report' from *Textile View*, and 'IT Forecast', 'Premiere Vision report' from *International Textiles*.

Selection of articles from the sources

Through the literature review on theoretical perspectives on effect of the ecology trend, we found that the concept of ecology in fabrics has emerged with the interest in minimizing pollution problems in fiber manufacturing and processing. The concept further advanced as the range of environment extended and the concept of environment-friendliness expanded (Arnold, 2001; "Green is the new black," 2007; Seo, 2005; Son & Kim, 2004; Yim & Kim, 2003). Based on these previous works, we identified key terms that are representative and closely related to the trend, Ecology; 'ecology', 'ecological', 'eco-friendly', and 'environmental-sensitive.' We only selected and analyzed the articles that contain these words in the title or in the text.

Identification of fabric themes in S/S ecology fabric trend

Themes selection procedure

From the articles that contained 'ecology', 'ecological', 'eco-friendly', and 'environmental-sensi-

tive,' terms giving primacy to adjectives that reflect the theme of S/S ecology fabric trends were collected. Primarily we selected 62 terms as transcribed and were categorized as 'primary level terminology.' Among the primary level terminology, terms that were judged to indicate similar meanings based on the dictionary were grouped together. Finally, we classified 62 terms into 6 groups through a grouping process. The theme terms that represent each cluster were selected from the words that have the highest frequency or can represent the meaning of the cluster best.

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Chronological changes of theme terms

Through descriptive analyses on the representative theme terms, we analyzed how often these 6 representative theme terms were used chronologically in the ecology fabric trends. We counted the frequency of the 6 terms each year and calculated percentage of each term by dividing by the frequency of all the trend theme terms each year.

Analysis of fabric-attribute terminology in S/S ecology fabric trends

Primary selection of fabric-attribute terms

In the research material, the terms, usually adjectives, describing the fabric attributes of S/S ecology fabric trends have been categorized for each year. Firstly, 165 terms were collected from all of the articles. Among the 165 terms, terms that had the same meaning based on a dictionary were unified, narrowing the number down to 38 terms.

Survey to refine the representative fabric-attribute terms

To further refine the 38 fabric-attribute terms and finally select the representative attribute terms, a survey to measure the similarity of the 38 terms was conducted. The survey used a 7-point Likert-type scale to measure the similarity of each pair of terms. Out of all the possible 703 pairs (i.e., $(38*37)/2$) of terms, a randomly selected set of 70 or 71 pairs were presented in the survey. A total of ten types of survey questionnaires were developed.

The age of the subjects was between 22 and 47 years old, and their jobs included fabric designers in fabric converter, fabric designers in fashion manufacturers, fashion designers and MD, undergraduate and graduate students majoring in Clothing and Textile, and fabric major students of fashion institutes. The survey was conducted for 40 days through May 28th to July 6th 2007, and a total of 542 questionnaires were collected during the study. 42 questionnaires were excluded from the study as they had missing values or lacked reliability in survey results. 50 responses were ensured for each pair of fabric-attribute terms for further analyses.

We calculated the mean value of the assessment score on the similarity measured through the survey and developed a 38*38 matrix composed of the similarity scores between each fabric-attribute term. Then hierarchical cluster analysis was done on each fabric-attribute term using SPSS 15.0 on the matrix on the similarity scores. S-Euclidian Distance was used as the distance measure and Ward Variance method was used for extraction method.

Correlation analysis between themes and fabric attributes in S/S ecology fabric trends

We conducted Pearson's product-moment correlation analysis and calculated bi-variate correlation's coefficients to examine the relationships between fabric attributes and ecology themes. After we finalized to select key terms of themes and fabric attributes, we counted the frequency of each term appeared in the sources. Means and standard deviations were selected for the correlation analysis. Then, correlation coefficients of $\pm 0.7-0.9$ between two variables were selected as high positive (or negative) coefficients between $\pm 0.4-0.7$ as mid positive (or negative) correlation. The significance level was at p -value of .005.

Results and Discussion

Six fabric themes for S/S ecology fabric trend

The terms, *natural*, *primitive*, *imitated natural*, *new natural*, *eco-friendly*, and *recycling* were selected as representative terms for ecology. The 6 selected representative theme terms are shown in Table 1 and more detailed description is given below.

The *natural* theme expresses a 'return to clean, pure and fresh nature' and indicates a nostalgia for rural life felt by people living in the city who are weary of urban life. The *primitive* theme is about being non-civilized, incomplete and rustic and indicates a wild and untouched image like the African jungle. The *imitated natural* theme shows the 'pursuit of artificial nature', nature made by human hands that attempt to mimic real nature, in effort to express man's adoration of nature. The

Table 1.
Fabric themes in S/S ecology fabric trend (1986-2005)

Themes	Description	Themes	Description
Natural	Clean natural Fresh natural Naive and pure natural Basic and simple natural Country or peasant style	Primitive	Completely untouched by man Imperfections created by nature Unmade Wild nature
Imitated natural	Designed by man with nature in mind False appearance in nature Modified natural Pretended natural Synthesized natural	New natural	Chic or urban natural Modern natural Sophisticated and super natural Reinvention or revolution of natural Balanced between the natural and the artificial Fusing nature and technology Harmony between natural and synthetic New way of harmony or new hybrid Techno-natural
Eco-friendly	Environmentally friendly Organic, no harmful chemical agent Eco benefit	Recycling	Reused Renewable

new natural theme can be considered as the ‘new hybrid’ theme that indicates an elegant, refined, and modern nature where nature and artificiality are in harmony. This theme not only indicates the clean and fresh nature of rural life, but also encompasses a refined architectural landscape existing in city life. The *eco-friendly* theme is interested in the ‘protection of the natural environment for the peace of the future’ and has surfaced with people becoming aware of harm done to the environment during the process of manufacturing fibers. Lastly, the *recycling* theme has the same purpose of protecting nature as the *eco-friendly* theme does, but it specifically shows an interest in the ‘recycling of used materials’ and also includes fabric design inspiration that is involved with recycled materials.

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Chronological analysis of fabric themes

1986-1990

The result of the frequency analysis on the 6 representative theme terms of each year showed significant changes in 5-year intervals. An analysis on the changes of the ecology trend’s themes between 1986 and 1990 is shown in Figure 1. First, from 1986 to 1990, the *natural* theme developed a mainstream following and gradually changed to the *primitive* theme. During this period, much was being paid to the protection of nature due to the antagonistic feelings that existed toward the industrialized world; this concern for the environment originated from an admiration of primitive nature. Clean, undeveloped, and primitive nature untouched by mankind was pursued during this period.

The Premiere Vision expressed the S/S of 1986 as “fresh and country inspired with a natural retro feel” (‘Premiere Vision Summer Reports 86’, 1985, p.3); it selected “natural: fresh, white, and pure” (‘IT predictions’, 1986, p.56) as the key words for the S/S fabric theme of 1987, and emphasized clean nature as an important theme image. This *natural* theme continued to 1988 as a report titled ‘Interstoff predictions: Women’s wear Summer 88 Fabrics’ selected ‘ecology’ as the key word for fabric. This report focused on the *natural* theme and selected “fabric, colors, and patterns directly inspired by nature” and “natural, neutral, earth, sand, and sea” (‘Interstoff predictions 88’, 1987, p.103) as the most important inspiration on ecology.

However, starting in 1989, the fabric theme in the trends of ecology gradually changed to *primitive* from *natural*. In 1989, another report ‘Piti Filati Preview 89’ selected *primitive* as an inspiration for fabrics and defined *primitive* as “dry texture looks used in a couture way” and “coarse, raw looks” (Piti Filati Preview 89, 1988, p.122).

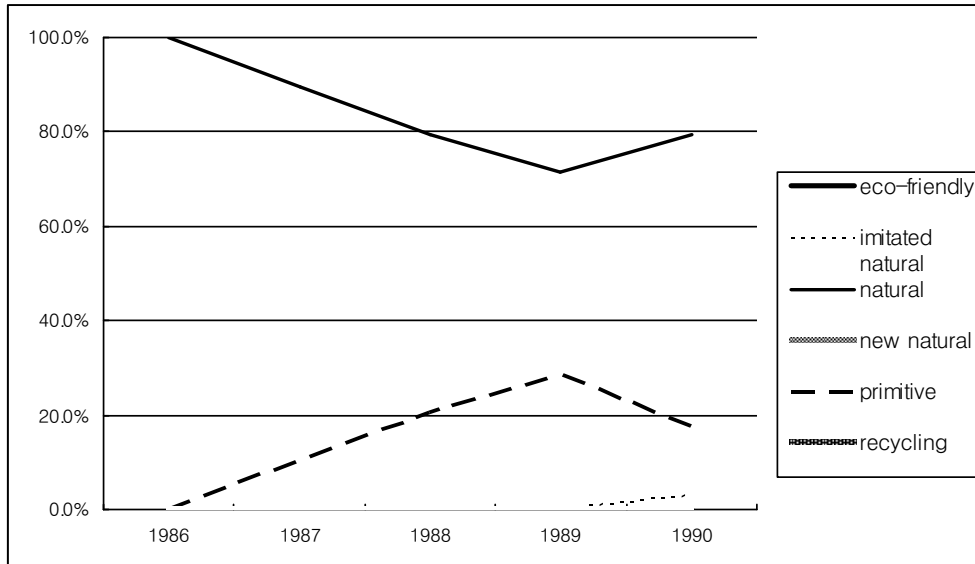


Figure 1.
Fabric themes in S/S ecology fabric trend (1986-1990)

1991-1995

The most distinguished characteristic of the period between 1991 and 1995 is that more various themes emerged compared to the previous periods and that *primitive* was paid more attention in the early period while *imitated natural* theme was given more attention after the middle of the period. In this period (1991-1995), a focus on nature shifted from pure nature to human who are sensible of nature. In other words, *imitated natural* theme could rise as the most important theme as highly advanced science and technology enabled to produce artificial products that pursue pure nature.) An analysis on the changes of ecology trends theme between 1991 and 1995 is shown in Figure 2.

The 'Forecast: Fabric Summer 1991' in *Textile View* stated, "nature at its wildest, most unpredictable (touches of Art Nouveau)," ('Forecast: Fabric Summer 1991', 1990a, p.58) and "Primitive: the Dark Continent and the magic and mystery of primitivism, primitive Africa, masks and magic. Africa has been a fashion source for the last three seasons," ('Fabric forecast 1991', 1990b, p.60), while emphasizing the *primitive* theme in the ecology trend.

However, the *primitive* theme faced some changes in 1992 and the fabric forecast report of *Textile View* in 1992 commented, "natural but more towards the sophisticated than the primitive," ('Fabric forecast 1992', 1991, p.50). The concept of *Ecolo-techno* was also mentioned, "We believe that the underlying trend is for fashion to go cooler and less frenetic taking its inspiration from a more harmonious blend of high-tech and ecological, science and nature" (p.55). This statement expressed the idea that the key fabric is "synthetics with a natural look." (p.55)

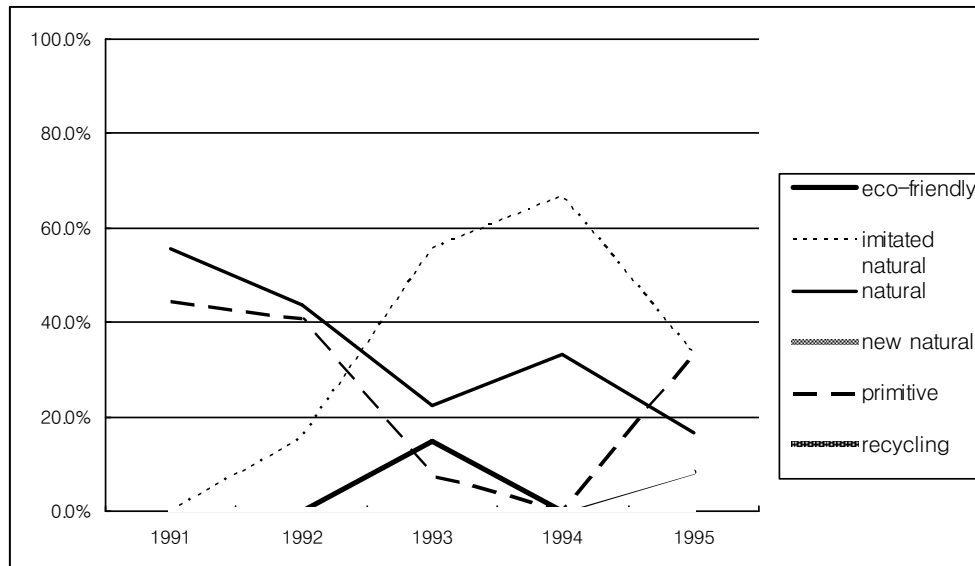


Figure 2.
Fabric themes in S/S ecology fabric trend (1991-1995)

In 1993, about the *imitated natural* theme, *Textile View* also mentioned, “They are the epitome of our desire to unite technology with nature. Indeed, ecological issues continue to be the dominant force behind fashion thinking but expressed in a new way,” (‘Women’s wear forecast’, 1992, p.71). During this period, fabric manufacturers were busy investigating eco-technology or the marriage of nature and science. *Textile View* considered this phenomenon as ‘imitating the nature’ and expressed, “We are only at the beginnings but the results are already there in more ‘eco-cottons’ and fabrics with sophisticated blends and finishes that are superlatively natural in handle and optics” (‘Women’s wear fabrics’, 1992, p.83.)

In 1994, a report called, ‘Fabric re-think: Women’s wear’ proposed a concept of ecology trend as, “we turn to nature and the natural yet again – not the obvious landscape nature..., but super nature or synthesized nature” as it expressed ecology fabric trends as “Natural synthesis” (‘Fabric re-think’, 1993, p.49). In other words, as we can see from the comment, “The usual approach to ecology and the environment has been to look at things designed by nature or originally created by nature. Now we reserve that situation to look at things designed by man with nature in mind,” (‘Fabric re-think’, 1993, p.49) the imitated nature was more emphasized unlike the past.

This trend continued to 1995 and the characteristics of fabric was expressed, “...a continuation of the generic mixing the synthetic with the natural.” (‘Women’s wear: Summer 95’, 1994, p.95)

The characteristic of the period between 1996 and 2000 is that in the early part of the period, the *imitated natural* theme, which had had the greatest affect during the previous period, was still influential, while the *new natural* theme gained importance at the same time. An analysis on the changes of the ecology trend's themes during the period between 1996 and 2000 is shown in Figure 3. During this period, the image of nature was expanded to allow room for richer and more luxurious touches. Apart from the image originated from a rural life in the country and primeval forest, the image of nature changed to be relevant to a modern natural image. Meanwhile, the *natural* theme at this time was differently expressed from the previous periods in that it manifested the complicated feelings of the fin de siècle as the end of the millennium approached. Also, the *primitive* theme re-emerged during the latter part of this period, providing a reinterpretation of the fin de siècle rather than indicating a wild and primitive nature associated with African jungles. This *primitive* theme can be interpreted as humans' adaptation and accommodation to nature after their awareness of the damages that they had caused nature. The *primitive* theme emerged in order to express the de-constructive feelings that served as evidence of humans' destruction of nature.

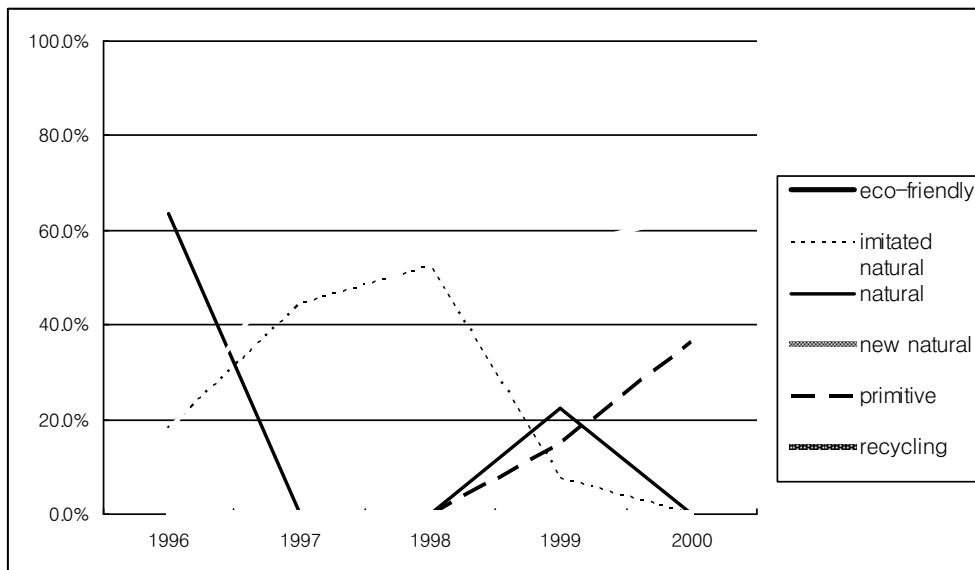


Figure 3. Fabric themes in S/S ecology fabric trend (1996-2000)

The actual expressions in the articles on the fabric theme that emerged during this period are noted as below. In 1996, a report noted coatings on the fabric surface that expressed the ecology trend and explained the characteristics of the fabrics of the period, stating “In the last two years, with all the feeling for ecology, non-colour and natural fibres interest in finishing...into textural and

natural surface effects. Now, with the upsurge in synthetics and 'glamorous textiles' finish counts as never before..." ('Fabric re-think: Summer 96', 1995a, p88.) Also, another report stated, "What's 'natural' doesn't necessarily have to be natural anymore. The same with synthetics" ('Women's wear: Summer 97', 1996, p.72) as the *new natural* theme slowly started to emerge.

The *new natural* theme that started in late 1996 had the greatest effects on the entire ecology fabric trend in the latter part of the period. Some reports on the *new natural* that emerged in this period expressed, "...a new sense of harmony between all things natural and synthetic. For this is the moment of polarisation—the luxury or the minimal, the traditional or the modern..." ('Women's wear: One step', 1997, p.66) and "Only nature has this gift of a simple elegance that is actually so worked and elaborate. There is a whole new feeling for naturals, but they must look and feel new and be nothing like the natural we had five years ago." ('Women's wear: All things', 1997, p.92)

In 1999, the *primitive* theme re-emerged along with the *new natural* theme. A report in *Textile View* explained the background of the re-emergence of the *primitive* theme by commenting, "At the heart of nature: ... not the cultivated clean, healthy and ecological nature of the early '90s but a nature that is wild, pure and completely untouched by man. Sources of inspiration are unlimited, for we are looking at the arid and austere side of nature which finally reveals it to be just as beautiful, delicate and sophisticated as the cultivated nature we know." ('Fabric forecast 99', 1998, p.132)

Again in 2000, much attention was paid on the *primitive* theme that re-emerged with the *new natural* theme. We could find a comment that appreciates the both themes as an inspiration on fabrics as below, "This is nature balanced by the engineered or nature being supplanted (*new natural* theme)... We long for the imperfections created by nature (*primitive* theme)." ('Inspirations', 1999, p.134)

2001-2005

Last of all, the characteristics of the period between 2001 and 2005 is that *new natural* theme emerged continuously in the early period, forming a mainstream. And in the latter period, the *eco-friendly* and the *recycling* themes which rarely emerged previously emerged as important themes. An analysis on the changes of the ecology trends theme of the period between 2001 and 2005 is shown in Figure 4. In this period, the point of view on nature returned to human. In other words, the environment-friendliness was expressed as the *eco-friendly* theme and the *recycling* theme. These themes emerged based on the consciousness that mankind is also a part of nature and nature should be protected for mankind's comfortable, peaceful, and healthy future.

Actual expressions in the articles on the fabric theme that emerged during this period are as below. As the *new natural* theme continued in 2001, the *natural* theme gained much attention again. The *new natural* theme that emerged in this period is expressed, "hyper real nature, super-natural opulence." ('Summer 2001', 2000a, p.129) A report titled, Forecast summer 2001, explained the re-emerged *natural* theme as, "Seek out natural freshness. Freshness, freshness, and still more freshness!" ('Forecast summer 2001', 2000b, p.121). This statement stressed that the key directions for the season are a strong feeling for the organic and the natural.

The *eco-friendly* theme newly emerged as the *new natural* theme continued to settle as an important stream of the ecology trend in 2002 and 2003. This period was described as "The reinvention

of Nature” (‘Summer 2002’, 2001, p.99) and a report, ‘Fabric summer 2002’ (2001, p58), emphasized that “reorganization of synthetic and natural fiber categories such as casein is rising in the development of fibers due to the effects of such themes.” Also, due to the effects of the *eco-friendly* theme, fibers developed eco-friendly were appreciated much in this period. An example comment is, “Better known under the Tencel label, lyocell production is based on an environmentally friendly process producing no harmful waste contrary to viscose whose heritage is much more damaging to nature.” (‘Fabric summer 2002’, 2001, p.59)

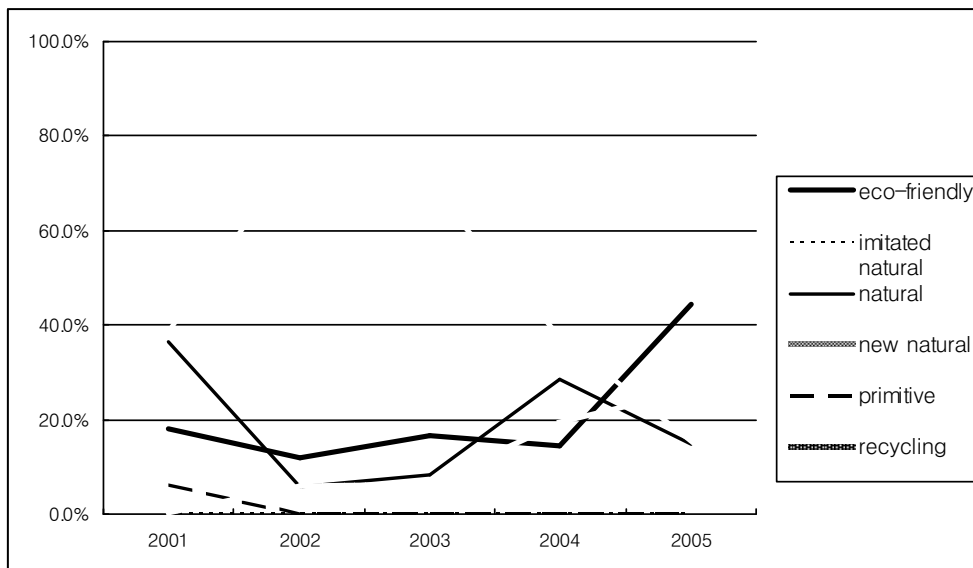


Figure 4.
Fabric themes in S/S ecology fabric trend (2001-2005)

Unlike previous years, the *recycling* theme was stressed as well as the *eco-friendly* theme in 2004 and 2005. As described, “The quest for new textile resources also involves the possibility of reducing waste or invasive substances, textiles derived from chitin or chitosan use shellfish and shrimp cuticles,” (‘Premiere Vision report’, 2004, p.2) we could find that eco-friendly fabrics and re-usable fabrics have been given spotlight.

Representative fabric-attribute terms for fabric themes

Hierarchical cluster analysis was done based on the similarity scores between the secondary fabric-attribute terms that were established through the survey results. Through cluster analysis, the terms were categorized into 11 clusters using a rescaled distance of 3 as the standard in order to put together terms that were considered to have similar meanings on fabric attributes. The Dendrogram is shown in Figure 5.

As a result eleven representative fabric-attribute terms of each cluster were selected with consideration of the frequency and meaning of the terms used during the past 20 years. The representative fabric attributes were *clean, comfortable, dry, lightweight, lustrous, soft, stiff, textured, thick, worn,* and *wet*. The representative fabric attributes of the 11 clusters and the sub-fabric attributes of each cluster are shown in Table 2.

Table 2.
Fabric attributes in S/S ecology fabric trend (1986-2005)

	Representative fabric attributes	Sub-fabric attributes
Visual attributes	Clean	Flat Smooth Basic Simple Clean
	Lustrous	Lustrous Shiny
	Worn	Aged Worn Torn
Tactile attributes	Dry	Crispy Dry Chalky
	Wet	Rubbery Wet Fluid
	Soft	Refined Sophisticated Fine Soft
	Stiff	Compact Structured Stiff
	Textured	Granular Rough Irregular Textured Linen look Raw Wrinkled
	Lightweight	Lightweight Papery Fragile Loose
	Thick	Thick Voluminous
Overall	Comfortable	Comfortable Stretch

Characteristics of fabric images shown in each theme

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In order to examine the characteristics of the fabric attributes of each theme, correlation analysis between the 6 themes and 11 fabric attributes was performed and the results are shown in Table 3. According to the analysis, the *natural* theme showed a positive correlation with the fabric attribute 'clean' and a negative correlation with 'stiff' and 'lightweight.' The analysis showed that the clean fabric image in texture was used more to express the *natural* theme whereas the lightweight fabric image was less frequently used.

Table 3.
Correlation analysis between fabric themes and fabric attributes in S/S ecology fabric trend (1986-2005)

		natural	primitive	imitated natural	new natural	eco- friendly	recycling
clean	Pearson Correlation	.480*	-.008	-.205	-.457*	.044	.215
	Sig. (2-tailed)	.032	.973	.386	.043	.853	.362
lustrous	Pearson Correlation	.322	-.515*	-.249	.078	.004	.143
	Sig. (2-tailed)	.167	.020	.290	.743	.986	.549
worn	Pearson Correlation	.077	.305	.059	-.467*	.283	.182
	Sig. (2-tailed)	.745	.191	.803	.038	.226	.441
dry	Pearson Correlation	-.107	.275	.215	-.114	-.136	-.137
	Sig. (2-tailed)	.654	.240	.363	.632	.568	.566
wet	Pearson Correlation	-.265	-.259	.418	.308	-.285	-.315
	Sig. (2-tailed)	.259	.271	.066 ⁺	.186	.223	.176
soft	Pearson Correlation	.340	.033	-.415	-.047	-.100	.036
	Sig. (2-tailed)	.143	.891	.069 ⁺	.844	.676	.881
stiff	Pearson Correlation	-.465*	.109	-.093	.359	.285	.309
	Sig. (2-tailed)	.039	.646	.696	.120	.223	.185
textured	Pearson Correlation	.174	.333	.156	-.393	-.108	-.306
	Sig. (2-tailed)	.463	.151	.511	.087	.651	.190
lightweight	Pearson Correlation	-.632**	-.203	-.053	.846**	.086	.024
	Sig. (2-tailed)	.003	.391	.826	.000	.718	.920
thick	Pearson Correlation	-.254	-.221	.205	.343	-.149	-.119
	Sig. (2-tailed)	.279	.349	.385	.139	.530	.616
comfortable	Pearson Correlation	-.441	-.021	.207	.333	-.015	.110
	Sig. (2-tailed)	.052	.930	.380	.151	.950	.645

⁺ Significant at $p < .10$ (2-tailed).

* Significant at $p < .05$ (2-tailed).

** Significant at $p < .01$ (2-tailed).

N for every correlation coefficient is 20

The reason why the *natural* theme exhibited a positive correlation with 'clean' is considered to be because the *natural* theme emerged in the mid 1980s when people began to pursue 'clean' nature. At that time people preferred flat and smooth fabric for expressing the *natural* theme. Meanwhile, the *natural* theme showing a negative correlation with 'stiff' is indicating that stiff fabric was generally used in the late 1980s when the *natural* theme declined. Also, 'lightweight' was preferred in the early 2000's after the *natural* theme has disappeared.

As for the *primitive* theme, though it was not statistically significant, correlation analysis showed (though not within the significance level) meaningful positive correlation coefficients with 'textured' and 'worn' fabric images higher than 0.3. And it showed a statistically significant negative correlation with 'lustrous.' Therefore, we can infer that the fabric images preferred in the *primitive* theme are images of unclean surfaces with textures or images that show worn or used effects on the surface. We can also see that clean and lustrous images were not frequently used to express the *primitive* theme. This shows that rough or textured fabrics were preferred in the late 1980s based on the adoration of primitive nature, that rose along with the *primitive* theme.

In cases with the *imitated natural* theme, because the theme did not emerge as an ecology fabric trend theme for a long time, there were no fabric attributes showing significant correlations. But it is worth mentioning that the *imitated natural* theme showed a positive correlation with 'wet' and a negative correlation with 'soft' at the significance level, $p < .10$. We can infer that 'wet' is the fabric image that was used more frequently in the *imitated natural* theme compared to other attribute terms. Besides, the fabric image 'wet' did not appear in the other themes where the *imitated natural* theme did. A wet-like touch was more preferred as polyester was more frequently used to complete a natural look in the *imitated natural* theme.

The *new natural* theme showed a positive correlation with 'lightweight' and a negative correlation with 'clean' and 'worn'. This indicates that the fabric image preferred in the *new natural* theme shows an interest in less emphasis on the visual attributes in fabric surface. The reason why the *new natural* theme, which emerged in the early 2000, showed a positive correlation with 'lightweight' is because elegant, sleek, and hybrid natural concepts were emphasized, and lightweight fabric, which had shown little importance in previous periods, was preferred during this period. Meanwhile, we can infer that the reason why the theme showed a negative correlation with 'worn' is because the *new natural* theme paid homage to a modern and refined nature in harmony with artificiality. Fabrics expressing the modern and refined nature seemed less relevant to 'worn' fabric, which usually expresses an old, aged, and torn out image.

Lastly, the *eco-friendly* theme and the *recycling* theme did not exhibit any statistically significant correlation with any fabric attributes. This can be attributed to the fact that these two themes appeared after 2000 and the duration period of the two themes is rather short compared to that of the others'. This must not ensure the necessary variability of case observations in statistical analysis. Whether these two themes will reappear again in the future and what fabric attributes will be mentioned to express these themes needs to be observed continuously.

Conclusion

This study aimed to provide an objective approach for tracking and forecasting fabric trends to support fabric companies in developing a trendy fabric for the upcoming season. In order to present an empirical base, we chose Ecology as a macro trend appearing during the spring and summer in fabrics. We examined what fabric themes were salient in manifesting the ecology trend. Then, we studied what specific fabric attributes were closely related to each theme. The results of this study can contribute to practitioners in that abstract and ambiguous trend terms can be interpreted with physical, substantial, and feasible attributes that they can easily understand.

To sum up, the ecology fabric trend has been manifested through various themes for a span of 20 years, and the related fabric attributes also differed significantly for each theme. For the themes in the ecology fabric trend between 1986 and 2005, the *natural* theme emerged first, then was followed by the *primitive* theme and the *imitated natural* theme. Then, from the late 1990s and 2000, the *new natural* theme and *eco-friendly* and *recycling* themes followed while the preferred fabric attributes of each theme changed accordingly. The clean fabric image was given top priority in the *natural* theme, which started in the 1980s as an aspiration toward nature. Textured or worn fabric images were preferred in the *primitive* theme, which started in the late 1980s and originated from the concept that we should protect primitive nature. Meanwhile, the wet fabric image was preferred in the *imitated natural* theme, which emerged in the early 1990s and expressed the imitation of nature. The *new natural* theme, which emerged in the late 1990s and continued on until early 2000, was a theme in which modern feeling was added to pure nature. While the *imitated natural* theme placed more emphasis on the perfect imitation of nature and appreciated artificial nature or nature built by humans, the *new natural* theme embraced the luxurious attributes in building a natural image. Lightweight fabric attributes that could be related to luxurious images was preferred to express the *new natural* theme.

This study needs to be complemented with further studies because it has some limitations. Our research focused only on the woven fabric trend and paid less attention to changes in colour. Further studies may study knitted fabrics and search the relevant attributes in conjunction with colors and patterns. Besides, we used the content analysis of terms from the published articles that explain the characteristics of fabric themes and attributes. In selecting the key terms, more reliable process would be necessary in order to prevent the authors' subjective opinion from being involved. An analysis of actual fabric objects can also provide meaningful implications in understanding the relationships between trend, theme, and fabric attributes such as colors, textures, and physical properties.

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References

- Arnold, R. (2001). *Fashion, desire and anxiety image and morality in the 20th century*. New Jersey: Rutgers University Press.
- Chun, Y. J. (2004). *The factors that influence to buy eco-friendly clothes-female customers*. Unpublished master's thesis, Seoul National University, Seoul, Korea.
- Chung, Y. K., & Geum, K. S. (2005). A study on grunge fashion in 1990's and 2000's. *The Journal of the Korean Society of Clothing and Textiles*, 29(3), 449-461.
- David W.W.Orr. (2004). *Nature of design: ecology, culture, and human intention*. Oxford: Oxford university press.
- Ecology-minded labels promote sustainable message. (2007, Oct. 31). *Women's Wear Daily*, 9.
- Fabric forecast 1991. (1990b). *Textile View*, 9, 60.
- Fabric forecast 1992. (1991). *Textile View*, 13, 50, 55.
- Fabric forecast 1999. (1998). *Textile View*, 39, 132.
- Fabric re-think: natural synthesis. (1993). *Textile View*, 22, 49.
- Fabric re-think: Summer 96. (1995). *Textile View*, 30, 88.
- Fabric Summer 2002. (2001. March). *Promostyl*, 58.
- Fabric Summer 2003. (2002. March). *Promostyl*, 65.
- Forecast Summer 2001. (2000, Feb). *Textile View*, 47, 121.
- Forecast: Fabric summer 1991. (1990, Feb). *Textile View*, 8, 58-59.
- Ha, J. S., & Kim, M. J. (1993). Primitivism expressed in modern fashion. *The Journal of the Korean Society of Clothing and Textiles*, 21, 193-201.
- Han, S. W., & Kim, Y. I. (1999). Ecological image in fashion during the early period of 1990's. *The Journal of the Korean Society of Clothing and Textiles*, 23(2), 296-306.
- Inspirations: New beginning. (1999). *Textile View*, 43, 134.
- Interst off predictions 88. (1987, March). *International textiles*, 103.
- IT Predictions summer 87. (1986, March). *International textiles*, 56.
- Kim, H. Y., & Kim, Y. I. (2006). A study on the characteristics of naturalism in fashion trends. *The journal of the Korean society of costume*, 56(7), 31-41.
- Kim, S. J. (2004). *The correlation with wool fabric trends and fabric characteristics-fall/ winter wool fabric trends-*. Unpublished master's thesis, Seoul National University, Seoul, Korea.
- Lee, K. A., & Jeon, H. J. (1998). A study on naturalism style of fashion-concentrating on the 1990s-. *The Korean Society of Costume*, 37, 253-270.
- Nam, J.K., & Geum, K.S. (2001). A study on the analysis of fashion trends in 1990s-focus on the themes of womens' fashion. *The Journal of the Korean Society of Clothing and Textiles*, 25(9), 1645-1654.
- Park, C. H., & Kim, J. G. (2001). *Fashion fabric planning*. Seoul: Kyomunsa.
- Piti Filati Preview 89. (1988, March). *International textiles*, 122.
- Premiere Vision summer reports 2005. (2004). *Premiere Vision Salon Newspaper*, 2.
- Premiere Vision summer reports 86. (1985). *Premiere Vision Salon Newspaper*, 3.
- Seo, H. S. (2005). *The study on eco-fashion design based on system and chaos*. Unpublished doctoral dissertation, Seoul National University, Seoul, Korea.

-
- Son, S. R., & Kim, J. H. (2004). A study of fashion design in the view of ecological environment- on the basis of the design using barley straw-. *The Korean Society of Fashion Design*, 4(1), 23-34. An analysis of the ecology fabric trend
- Summer 2001 by Premiere Vision (2000a). *Textile View*, 49, 129.
- Summer 2002 (2001), *Textile View*, 53, 99.
- Women's wear fabrics: Summer 93 (1992). *Textile View*, 17, 83.
- Women's wear forecast: Summer 93 (1992). *Textile View*, 16, 71.
- Women's wear: All things bright and beautiful (1997). *Textile View*, 36, 92.
- Women's wear: One step forward, one step back (1997). *Textile View*, 34, 66.
- Women's wear: Summer 95 (1994). *Textile View*, 25, 95.
- Women's wear: Summer 97 (1996). *Textile view*, 33, 72.
- Yim, E. H., & Kim, M. J. (2003). A study on the subcultural style in the 1990s. *The Journal of the Korean Society of Costume*, 53(3), 13-24.