Research on college students' garment consumption behavior and low-carbon lifestyle

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Abstract. We survey 260 college students on their lifestyles on carbon footprint and their garment consumption behavior. Using the methods of factor and cluster analysis in SPSS, we show that there is a strong relationship between a carbon lifestyle and purchasing decisions on garment. Students with low-carbon lifestyle tend more likely to make environmentally friendly decisions. It provides necessary basic information for garment enterprises to develop marketable products and a corresponding market.

1. Introduction

As a society and its economy evolve, life quality normally becomes better. Consumers’ taste of commercial products changes as a result. They will demand products with more spiritual satisfaction that reflects value of responsible actions to the society. A low-carbon lifestyle is one of elements of such value that is pursued by the consumers. It represents a healthy, natural, and environment-friendly life. The lifestyle offers less burden to the environment and could also cost less economically. The garment industry is closely related to consumers’ pursuit in such aspect because the production of garment traditionally involves pollutions. For the industry, to cater such rising lifestyle, it needs to understand consumer behavior of low-carbon lifestyle.$^{[1]}$ This research is an attempt to shed lights in this area. The report studies purchasing decisions of consumers with low-carbon lifestyle. It demonstrates that among college students those with low-carbon lifestyle indeed are more likely to purchase environmentally friendly products than other groups.

2. Low-carbon lifestyle

In recent years, low-carbon lifestyle has become a hot topic for scholars to discuss. However, there has been no consensus on the definition of low-carbon lifestyle. However researchers have come to agree that a low-carbon lifestyle includes the following three characteristics: The first is that low-energy consumption should be part of the lifestyle. This includes stress on reducing energy consumption in life, so as to decrease carbon emissions, especially carbon dioxide to relief the pressure on the environment and alleviate climate warming. This view is the most commonly accepted.$^{[2]}$ The second is to emphasize a simple, plain and frugal lifestyle and advocate the economization of making the best use of everything, so as to reduce the emission of carbon dioxide in life, and reduce air pollution and slow down the phenomenon of ecological destruction and atmospheric warming. The third is that low-carbon lifestyle is a low-cost and low-pay behavior. All these views are that low-
carbon lifestyle is about low energy consumption, Guozhan Tang is the early scholar to put forward the concept of ecological lifestyle from the theory. His master's thesis "College Students' Lifestyle and Conduct Research" puts forward the relevant standards of civilized and healthy lifestyle,\textsuperscript{[4]} China's research on low-carbon lifestyle is in relatively early stage.

At present in China consumers are not fully informed on low-carbon life. College students are more educated and informed on environmental issues. They are not only the first to learn and adopt a low-carbon and environmental lifestyle, but also likely to spread the ideas of low-carbon lifestyle to other consumers.\textsuperscript{[5]} However, research on low-carbon lifestyle, especially on low-carbon lifestyle of college students, is scant. This paper aims to fill the gap in it by exploring the relationship between lifestyle and consumption behavior among this group of young consumers.

3. Questionnaire and analysis

3.1. Investigation methods

In the survey, 270 questionnaires were distributed and 260 valid complete questionnaires were received online. In the questionnaire, there are 61 questions in total. It consists of three parts: basic information of college students, low-carbon lifestyle and consumption behavior.

All data were processed by statistic package software SPSS. Specifically, we have done the following:

- Using factor analysis method to analyse the low-carbon lifestyle of the respondents.
- Using cluster analysis to classify the low-carbon lifestyle of College Students.
- Cross examining consumption behavior and low-carbon lifestyle.

3.2. Investigation results and analysis

3.2.1. Basic information. Of the 260 college students surveyed, 80 (31\%) are male and 180 (69\%) are female. The ratio is in line with the sex ratio between men and women. Among the students, 14(5.38\%) are freshmen, 40 (15.38\%) are sophomores, 54(20.77\%) are juniors, 124(47.69\%) are senior, and 28(10.77\%) postgraduates and above. The respondents' majors are evenly distributed in science (29.23\%), arts (39.23\%) and engineering (31.54\%).

3.2.2. Factor analysis on the low-carbon lifestyle questions. We want to classify our subject college student based on 11 representative carbon lifestyle questions. A low-score response to a carbon lifestyle question indicates that the subject is closer to have a low-carbon lifestyle. Since the number of life-style questions is relatively large, we decide to use factor analysis to reduce the questions into smaller set of factors.

The factor analysis applies principal component analysis with rotations to compute the factors based on the 11 questions. A low-score response to a carbon lifestyle question indicates that the subject is closer to have a low-carbon lifestyle. Since the number of life-style questions is relatively large, we decide to use factor analysis to reduce the questions into smaller set of factors.

The factor analysis applies principal component analysis with rotations to compute the factors based on the 11 questions. Only those factors(components) with larger than eigenvalue of 1 are selected. The following table shows the eigenvalues of factor components. We select the first three components as our factors based on their eigenvalues greater than 1.

| Component (factor) | Initial Eigenvalues | Extraction Sums of Squared Loadings | Rotation Sums of Squared Loadings |
|-------------------|---------------------|-----------------------------------|----------------------------------|
|                   | Total | Variance\% | Cumulative \% | Total | Variance\% | Cumulative \% | Total | Variance\% | Cumulative \% |
| 1                  | 2.217 | 20.158    | 20.158        | 2.217 | 20.158    | 20.158        | 1.966 | 17.869    | 17.869        |
| 2                  | 1.378 | 12.526    | 32.684        | 1.378 | 12.526    | 32.684        | 1.446 | 13.147    | 31.016        |
| 3                  | 1.067 | 9.703     | 42.388        | 1.067 | 9.703     | 42.388        | 1.251 | 11.371    | 42.388        |
| 4                  | .951  | 8.648     | 51.035        |        |           |                |       |            |                |

Table 1. Total variance explained.
The factor loadings for each component factor are shown in the following table.

**Table 2. Rotated component matrix.**

| Questions                                                                 | Component(factor) |
|---------------------------------------------------------------------------|-------------------|
| 1. Method of commute: Walking, Bike Sharing, Public Transit, Ride Share or Drive. | .158 - .077 .698 |
| 2. Do you prefer organic foods?                                           | .512 .292 .115   |
| 3. Do you use handkerchief?                                               | .056 .665 -.066  |
| 4. Do you turn light switch off when there is power outage?              | -.124 .267 .686  |
| 5. Do you sort waste correctly?                                          | .610 -.022 -.065 |
| 6. Do you use recycled water?                                             | .510 .101 -.079  |
| 7. How would you describe yourself in terms of purchasing habit?          | .459 -.160 .424  |
| 8. Would you buy used products?                                           | -.075 .598 .108  |
| 9. Would you choose products with low-carbon footprint if there were choices? | .644 -.024 .086  |
| 10. Do you understand the meaning of low-carbon lifestyle?                | .601 .048 .258   |
| 11. Do you participate social events on low-carbon lifestyles?            | .189 .667 .016   |

Using an absolute value of 0.4 as the cutoff value for significant loadings, we find that factor 1 is mainly comprised of questions 2, 5, 6, 7, 9, 10, that factor 2 is mainly comprised of questions 3, 8, 11 and that factor 3 of questions 1, 4, 7. Since factor 1 mostly are affected by food choice (question 2), waste disposition (question 5, 6) and attitude (question 9, 10), which are indoor activities, we label factor 1 as Indoor Living factor. Factor 2 mostly comes from transportation (question 1). We label factor 2 as Outdoor Living factor and factor 3 as Energy Living factor.
3.2.3. **Cluster analysis on the survey subjects based on the factors.** Applying cluster analysis to the three factors, we group our surveyed college students into two categories. We then compute the mean scores for each group for the three factors and the 11 low-carbon lifestyle questions. We perform an F-test on the zero hypotheses that the group means are the same. If the F-test rejects the zero hypotheses, there is significant difference between the means scores of the two groups.

The following table shows the mean factor scores as well as low-carbon lifestyle questions for each group. We only report mean scores that show significant difference between the two groups at 95% confidence level. Checking the mean scores of factor 1 (Indoor living) scores and lifestyle questions, we find that all mean scores of group 1 are significantly lower than those of group 2. Since lower factor scores or low-carbon lifestyle questions reflect a low carbon lifestyle, consistent with the scoring scheme of the original 11 questions, we label group 1 as Low-Carbon and group 2 as High-Carbon.

Mean scores of Factor 2 (Outdoor Living), Factor 3 (Energy), and low-carbon lifestyle questions 3, 7, 8 are not reported in the table because the differences between mean scores of group 1 and 2 are not statistically significant at 95% confidence level.

| Cluster Number of Case | Factor 1: Indoor Living | 1. | 2. | 4. | 5. | 6. | 9. | 10. | 11. |
|------------------------|-------------------------|----|----|----|----|----|----|----|----|
| 1 (Low Carbon) Mean    | -0.6542503              | 2.51 | 1.75 | 1.55 | 1.89 | 1.98 | 1.75 | 1.82 | 2.18 |
| N                      | 158                     | 158 | 158 | 158 | 158 | 158 | 158 | 158 | 158 |
| Std. Error of Mean     | 0.04289017              | 0.093 | 0.060 | 0.040 | 0.070 | 0.062 | 0.058 | 0.046 | 0.072 |
| 2 (High Carbon) Mean   | 1.0134466               | 3.03 | 2.35 | 2.13 | 2.94 | 2.66 | 2.70 | 2.51 | 2.28 |
| N                      | 102                     | 102 | 102 | 102 | 102 | 102 | 102 | 102 | 102 |
| Std. Error of Mean     | 0.06306673              | 0.114 | 0.080 | 0.049 | 0.083 | 0.084 | 0.088 | 0.066 | 0.073 |
| Difference in Mean Scores | Group 1- Group 2     | -1.66770 | -0.52 | -0.6 | -0.06 | -1.05 | -0.68 | -0.95 | -0.69 | -0.1 |
| F-Statistics (ANOVA)    | p-value                 | 0.000 | 0.001 | 0.000 | 0.036 | 0.000 | 0.000 | 0.000 | 0.000 | 0.009 |

*a* Lower mean value indicates lower carbon lifestyle.

3.2.4. **The relationship between low-carbon lifestyle and garment consumption behavior.** Our survey also asks college students’ purchasing behavior on garment. We focused on their willingness to take into account of environmental or sustainable consideration when shopping or buying clothes. Five representative questions are selected for reporting here. A high value score in these questions indicates an environmentally conscious mind in garment consumption. The following table shows the mean values of responses from the two groups of subjects. The results provide a strong connection between carbon lifestyle and environmental consumer behavior. For example, in terms of fabric preference in clothes consumption (question 1), low-carbon students prefer more cotton than high-carbon students. Similarly, in question 5, low-carbon students are also more likely to buy reusable, recycled or renewable clothes.

| Table 4. Five representative questions about consumption behavior. |
|---------------------------------------------------------------|
| 1. Do you prefer cotton fabric when buying clothes?   |
| 2. Will you check if there is “environmental”, “sustainable” or “natural material” on the label when buying clothes? |
| 3. Do you bring your own shopping bags?     |
| 4. Would you recycle used clothes if the recycling services were available |
Table 5. Cross analysis of consumption behavior and low-carbon lifestyle.

| Cluster Number of Case | 1.  | 2.  | 3.  | 4.  | 5.  |
|------------------------|-----|-----|-----|-----|-----|
| 1 (Low Carbon)         | .85 | 2.15| .36 | 3.80| 3.19|
| Mean Std. Error of Mean| .028| .058| .038| .097| .081|
| N                      | 158 | 158 | 158 | 158 | 158 |
| 2 (High Carbon)        | .73 | 2.04| .21 | 3.71| 2.86|
| Mean Std. Error of Mean| .044| .068| .040| .114| .107|
| N                      | 102 | 102 | 102 | 102 | 102 |

Difference in Mean Scores

Low Carbon-High Carbon: 0.12 0.11 0.15 0.09 0.33

F-Statistics (ANOVA) p-value

.01 .002 .008 .0007 .014

*a Higher mean value indicates more environmentally responsible consumption in clothes.

4. Conclusion

In this research, we survey 260 college students in China about their carbon footprint on some low-carbon lifestyle questions. Based on the answers of these questions, we classify 260 students into two groups, Low-Carbon and High-Carbon.

We also survey these students on their consumption behavior when buying clothing. We find a strong link between lifestyle and environmentally responsible purchasing decision. Students with low-carbon lifestyle tend more likely to make environmentally friendly decisions.

This research contributes to the understanding of consumer choices in garment industry. Garment accounts for around 10% of greenhouse emissions from human activity. Sustainability has become hot research topic in recent years. One important question to ask is how the sustainability is related the consumption behavior. Our research sheds lights on this aspect by investigating this relationship among college students.

A future study could be extended to a larger set of subjects, including people of all ages and educational levels. We could also employ more sophisticated statistical methods to quantify the impact of low-carbon activities on fashion consumption choices.

Acknowledgments

Supported by the Open Project Program of Fujian Clothing Industry Technology Development Base, Minjiang University, China.

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