

Study on green consumption behavior and its influencing factors of college students under dual carbon background --Taking Harbin University students as an example

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Abstract. Nowadays, the adverse effects of climate change are becoming more apparent, the urgency for global action continues to grow. Climate change is a global challenge, the global transition to a low-carbon world. In order to solve this problem, China has put forward two goals: "carbon neutrality" and "carbon peak". Contemporary college students are important participants in green consumption and a major force in the future society. The realization of the dual carbon goal needs the efforts of college students. Therefore, this article takes Harbin city college students as the research object, through the study of college students' propensity to consume and consumption psychology research and analysis, learned that college students for the green consumption cognition, selection and orientation, which can be based on the current college students' green consumption behavior to analyze its impact on the development of "double carbon", and according to the consumption of college students, enhance the corresponding propaganda and education, It can promote the better implementation of the "dual carbon" strategy.

Keywords: Carbon peaking and carbon neutrality, College students, Green consumption, Influence factor.

1. Introduction

1.1 Project context

Now that the adverse effects of climate change are becoming more apparent, the urgency for global action continues to grow. The international community has gradually reached a consensus on climate governance, and global warming, sea-level rise and other crises need to be addressed urgently. The adoption of the Paris Agreement in December 2015 marks the emergence of a just and equitable global governance system featuring win-win cooperation. Climate change is a global challenge, the global transition to a low-carbon world. In China, with the development of modern society, people's pursuit of a green and healthy life is increasingly strong, and their concern about atmospheric environment changes is increasing, especially the greenhouse effect, haze and other aspects are particularly concerned.

To address this problem, the CPC Central Committee with Comrade Xi Jinping at its core has taken into account both domestic and international considerations and made a major strategic decision to achieve a peak in carbon dioxide emissions and a steady decline by 2030. By 2060, a green, low-carbon and circular economic system and a clean, low-carbon, safe and efficient energy system will be in place, and carbon neutrality will be achieved. On October 24, 2021, The State Council issued the Opinions on Implementing the New Development Concept to Achieve Carbon Peak and Carbon Neutrality in a Complete, accurate and comprehensive manner. It clearly pointed out that by 2025, a green, low-carbon and circular economic system would take shape, and the energy utilization efficiency of key industries would be greatly improved. A 13.5% reduction in energy consumption per unit of GDP from 2020; Cut carbon dioxide emissions per unit of GDP by 18% compared with 2020; About 20% of non-fossil energy consumption; The forest coverage rate reached 24.1 percent, and the forest stock reached 18 billion cubic meters, laying a solid foundation for achieving carbon peak and carbon neutrality.

1.2 Significance

In order to better promote the overall green transformation of economic and social development, we should not only rely on the government's policy promotion, but also need the active participation of all sectors of society. Contemporary college students, as the young force to implement national policies, need to exert their own energy in the practice of "double carbon". Therefore, in this context, through the study of college students' consumption behavior and influencing factors, analysis of college students' consumption tendency, and then reflect the necessity and importance of the government's implementation of the dual carbon strategy, and from the reflection of what contribution college students can make to achieve carbon neutrality as soon as possible.

1.3 The research foundation of predecessors:

The research on consumers' desire for environmental protection. For example, in Balderjah n's study, he concluded that individual's environmental awareness and attitude towards ecological pollution would affect their behavior habits. [1] In the study of Schwepker and Cornwell, it is believed that consumers with environmental awareness have a stronger desire to consume environmentally friendly products. [2] Eva proposed to solve some social dilemmas in low-carbon consumption behavior by establishing low-carbon communities. [3] Wang jianhua and Tou lulu in environmental literacy influence on consumers' green consumption behavior study, put forward the four dimensions of environmental quality, namely, environmental values, environmental responsibility, environmental awareness and environmental behavior skills, both through the green consumption intention indirectly influence on green consumption behavior, in line with the action phase theory, the influence mechanism. Among them, environmental values have a significant positive impact on green consumption behavior through the implementation intention of green consumption. Environmental responsibility and environmental behavioral skills have a positive impact on green consumption behavior through two mediating variables: green consumption goal intention and green consumption executive intention, and green consumption goal intention significantly affects green consumption executive intention. The influence of environmental problem perception on green consumption behavior follows the path of "environmental problem perception - green consumption goal intention - green consumption implementation intention - green consumption behavior", and has a significant negative impact on green consumption behavior. [4] Based on the viewpoints of various scholars, it can be seen that green consumption behavior is inseparable from consumers' environmental awareness. To practice green consumption, it is necessary to clarify the relationship between environmental awareness and green consumption behavior.

2. Logical frame and empirical approach

2.1 Logical frame

According to Ajzen's theory of planned behavior, we believe that one of the factors affecting consumption behavior is personal psychology. Different people's values, sense of responsibility and herd psychology will lead to different consumption behaviors. For example, girls spend a lot on cosmetics, but boys spend little on cosmetics.[5] According to the ABC theory proposed by Guagnano and other scholars, we believe that consumption behavior will be affected by external environmental factors. For example, the degree of choice of low-carbon products, the corresponding degree of publicity and education, and the degree of availability of low-carbon concepts will have an impact on college students' green consumption behavior. [6] According to Wang Jianming, Xu Zhenyu and Hines J M, Hungerford H R, Tomera A N. ", we found that people will have different consumption behaviors due to gender and age, and will adopt different consumption behaviors according to family income. [7] According to Sia A P, Hungerford H R, Tomera A N. We found that different people have different low-carbon consumption behavior abilities, mainly including cognitive ability, choice ability and operation ability.[8]

Therefore, we choose to construct the analysis framework of college students' low-carbon consumption behavior from four aspects: personal psychological factors, external environmental factors, demographic factors and low-carbon consumption behavior ability.

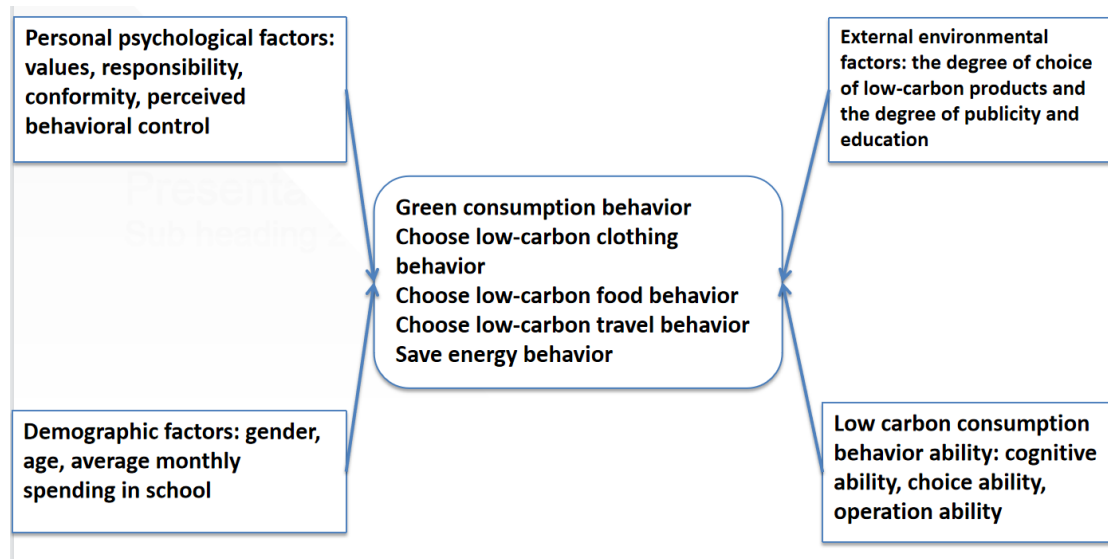


Figure 1. Analysis framework of college students' low-carbon consumption behavior

2.2 Empirical approach

2.2.1 One factor variance model

In order to investigate the influence of different levels of each factor variable on "low-carbon consumption behavior", one-way variance model was constructed for analysis. The model can be expressed as $x_{ij} = \mu + a_i + \varepsilon_{ij}$ ($i = 1, 2, \dots, k$; In formula (1), x_{ij} is the sample value of the JTH test at the i th level of the control variable; μ is the total theoretical index value of the observed variable (note: μ is the theoretical index value of the observed variable at the i th level of the control variable); A_i is the additional influence of the i th level of the control variable on the test results, which can also be called the effect of the i th level of the control variable on the observed variable. ε is the sampling error and is an independent random variable subject to distribution $N(0, \sigma^2)$. K is the level number of control variables; R is the average number of samples at each level of the control variable (i.e., r trials).

2.2.2 Multiple linear regression model

Multiple linear regression model As a result of the investigation is interpreted variable is "low carbon consumer behavior of college students, is measured by likert 5 volume table, is a numeric variables, and variables Main is numeric variables, conform to the requirements of the linear regression analysis of the basic conditions, so this article constructs the multiple linear regression model, The ordinary least square method is used to fit the regression equation and estimate the parameters. The mathematical model of multiple linear regression is: $Y = \beta_0 + \beta_1 \chi_1 + \beta_2 \chi_2 + \dots + \beta_k \chi_k + \varepsilon$ (2) Formula (2) is a k -element linear regression model, in which Y is the solved variable. χ was the explanatory variable, with k explanatory variables. β_0 is the constant term of regression model. $\beta_1, \beta_2, \dots, \beta_k$ are partial regression coefficients. ε is the random error of regression model. Among them, the change of explained variable Y is composed of two parts. The first part is the linear change of Y caused by the change of k explanatory variable χ , and the second part is the change of Y caused by other random factors, namely ε .

3. Data sources and descriptive statistics:

3.1 According to the research theme and content

From January 16, 2022 to February 21, 2022, this study conducted a questionnaire survey on college students in ten universities in Harbin by combining random sampling and typical sampling. A total of 2,548 questionnaires were collected, and the completeness and logicity of the collected questionnaires were reviewed and confirmed. 164 unqualified questionnaires were removed, and 2384 valid questionnaires were formed, with effective questionnaire recovery rate of 93.56%. The number of respondents from Harbin Institute of Technology was 223, accounting for 9.35%; 268 students from Harbin Engineering University, accounting for 11.24%; Northeast Forestry University 264, accounting for 11.07%; 250 from Northeast Agricultural University, accounting for 10.49%; Harbin University of Science and Technology 220, accounting for 9.23%; 224 students from Heilongjiang University, accounting for 10.23%; 236 students from Harbin Medical University, accounting for 9.9%; Harbin Normal University 225 students, accounting for 225 students; Heilongjiang Hospital of Traditional Chinese Medicine University 254, accounting for 10.65%; 200 students from Harbin University of Commerce, accounting for 8.39%.

3.2 Descriptive statistics

3.2.1 According to the collation and analysis of the survey data,

There were 1109 male respondents in 2384 samples, accounting for 46.52%. There were 1,275 female respondents, accounting for 53.48%. There were 408 freshmen, accounting for 17.11%; There were 743 students in the sophomore year, accounting for 31.17%; There are 766 junior students, accounting for 32.13%; There are 467 senior students, accounting for 19.59%. It can be seen that each characteristic index value of the sample is different and widely distributed without obvious central trend, which can be used for further statistical data processing and analysis of this study.

3.2.2 Descriptive statistics and analysis

Likert scale was used for the measurement of variables and option assignment in the model, that is, a group of statement questions about attitudes or opinions about something was first set up, and the choice of the question was divided into five grades. The respondents made corresponding choices on these statement questions according to their actual situation and true thoughts.

The difference between the average value and 2.5 was used to measure the degree of tendency, and the relevant index values were calculated according to the obtained results, and the model was built to draw conclusions according to the correlation between each factor and the explained variable.

According to the preliminary statistics, the average monthly consumption in school is 3.2984, indicating that the ability of respondents to implement low-carbon consumption behavior is at a slightly above medium level. The average value of the respondents' willingness to buy less unnecessary clothes is 3.1687, indicating that the respondents' tendency to implement low-carbon consumption behavior is at a medium and slightly above level. When buying clothes, the average value of choosing natural fabrics is 3.1348, indicating that the respondents' willingness to implement low-carbon consumption behavior is at a medium and slightly above level. The mean value of the respondents' willingness to eat less fried food and meat was 3.0998, indicating that the respondents' willingness to implement low-carbon consumption behavior was at a slightly higher level. When traveling, the average of respondents willing to choose walking or public transportation is 3.2976, indicating that respondents' willingness to implement low-carbon consumption behavior is at a medium and slightly above level. In daily life, the average value of the habit of saving electricity was 3.6755, indicating that the awareness of implementing low-carbon consumption behavior was at a high level. The average value of the respondents who considered low-carbon consumption as an environmentally friendly and healthy consumption way was 3.8234, indicating that the respondents had a high level of awareness of low-carbon consumption behavior. The average value of the respondents' willingness to sacrifice some personal interests in order to meet the low carbon standards

is 3.2118, indicating that the respondents' willingness to implement low carbon consumption behavior is at a medium and slightly higher level. The average value of not being influenced by people around them to buy unnecessary things is 3.3131, indicating that the awareness of the respondents to implement low-carbon consumption behavior is at a slightly above medium level. If there is a requirement of low-carbon behavior in life, the average of those who are willing to do it is 3.4238, indicating that the respondents' willingness to implement low-carbon consumption behavior is at a medium and slightly higher level. The average value of low-carbon products that can be easily purchased in shopping is 3.1092, indicating that low-carbon consumption has a wide range of choices. In study and life, the average value of knowledge about low-carbon consumption frequently received is 3.4936, indicating that the tendency of respondents to implement low-carbon consumption behavior is at a medium slightly above level. When learning new knowledge, the average value of being able to grasp and apply it quickly was 3.368, indicating that the learning ability of the respondents was above the average level. When consuming, the average value of being able to clearly choose the commodities they need is 3.7513, indicating that the selection ability of respondents is at a high level. The average value of the respondents' willingness to learn knowledge and skills related to low-carbon consumption is 3.357, indicating that the respondents' willingness to learn low-carbon consumption behavior is at a slightly above medium level.

Through data analysis, it can be seen that the average score value of all influencing factors and explained variables is higher than 3, indicating that the tendency of college students in Harbin to carry out green consumption behavior is above the average level.

4. Results and analysis

The group used IBM SPSS Statistics26 to conduct anOVA and multiple linear regression analysis on the results of the questionnaire survey. The evaluation indicators of consumption behavior are composed of four aspects: "choose low-carbon clothing behavior", "choose low-carbon travel behavior", "choose low-carbon food behavior" and "save energy behavior", which are presented in the form of five questions in the questionnaire.

4.1 Analysis of variance

In order to determine whether the variables in the influencing factors have a significant impact on "low-carbon consumption behavior", the one-way variance model is adopted for analysis. The results show that the significance test of gender variable in individual statistical factors is 0.054, higher than the significance test level of 0.05, that is, there is no significant difference in the influence of different genders on green consumption behavior of college students. The significance test of "grade" variable was 0.111, higher than the significance test level of 0.05, indicating that there was no significant difference in green consumption behavior of college students of different grades. The significance of the variable of "average monthly consumption" is 0.000, which is less than the level of significance test, indicating that average monthly consumption has a significant impact on green consumption behavior. The significance of "values" variable in individual psychological factors was 0.000, which was lower than the significance test level of 0.05, indicating that values had a significant impact on college students' green consumption behavior. The significance of "sense of responsibility" variable was 0.000, which was lower than the significance test level of 0.05, indicating that sense of responsibility had a significant impact on green consumption behavior of college students. The variable significance of "conformity psychology" was 0.000, which was lower than the significance test level of 0.05, indicating that conformity psychology had a significant impact on green consumption behavior of college students. The variable significance of "perceived behavioral control" is 0.000, less than the significance test level of 0.05, that is, perceived behavioral control has a significant impact on college students' green consumption behavior. Among the external environmental factors, the significance level of the variable of "the selectable degree of low-carbon products" is 0.000, which is lower than the significance test level, indicating that the selectable degree

of low-carbon products has a significant impact on college students' green consumption behavior. The significance level of the variable of "publicity and education level" is 0.000, which is lower than the significance test level of 0.05, indicating that publicity and education level has a significant impact on green consumption behavior of college students. The significance of "cognitive ability" variable in low-carbon consumption behavior ability was 0.000, which was lower than the significance test level of 0.05, indicating that cognitive ability had a significant impact on green consumption behavior of college students. The significance of the variable "choice ability" is 0.000, which is lower than the significance test level of 0.05, indicating that choice ability has a significant impact on college students' green consumption behavior. The significance of the variable "operation ability" is 0.000, which is less than the significance level, indicating that operation level has a significant impact on college students' green consumption behavior.

The results of variance analysis show that gender and grade have no significant influence on college students' green consumption behavior. Therefore, no matter what gender, what grade of college students will have an impact on low-carbon consumption.

4.2 Analysis of regression

We adopted a multiple linear regression model, with "low-carbon consumption behavior" as the explained variable, and individual psychological factors, demographic factors, external environmental factors and indicators of low-carbon consumption behavior ability as the explanatory variables.

SPSS was used for screening and multiple linear regression. As the results showed that demographic factors had no significant impact on green consumption behavior, they were removed from the regression equation. Therefore, the analysis showed that: $Y = 0.212x_1 + 0.125x_2 + 0.147x_3$, where Y represents green consumption behavior, X1 represents personal psychological factors, X2 represents external environmental factors, and x3 represents low-carbon consumption behavior ability. According to the regression equation, when the significance level is 0.05, the variables of "personal psychological factors" have a significant impact on "green consumption behavior", and the influence coefficient is 0.212, indicating that the stronger the values, sense of responsibility, perceived behavioral control, the weaker the conformity psychology of college students are more likely to engage in green consumption behavior. When the significance level is 0.05, the variable of "external environmental factors" has a significant impact on "green consumption behavior", and the influence coefficient is 0.125, indicating that the stronger the "choice degree of low-carbon products", "publicity and education" and other factors are, the more likely college students will engage in green consumption behavior. The variable of "low-carbon consumption behavior ability" has a significant influence on "green consumption behavior" when the significance level is 0.05, and the influence coefficient is 0.147, indicating that college students with stronger low-carbon consumption behavior ability are more likely to engage in green consumption behavior.

5. Conclusion

5.1 According to this study, the following conclusions can be drawn:

(1) According to the result of variance analysis shows that in college students groups, age, gender is no significant effect on green consumption behavior, know whether it is a grade and gender, and how will produce certain carbon emissions, all need to learn and practice of green consumption, green consumption, to reduce carbon emissions is every college students should do.

(2) According to the result of regression analysis shows that the individual psychological factors, external environmental factors, low carbon consumption behavior ability all three factors has a significant effect on green consumption behavior, is the practice of green consumption needs not only college students' sense of responsibility, strengthen individual values, strengthen the practice ability, also need outside help and push.

5.2 Enlighten

(1) College students need to establish good values and actively practice green consumption. See yourself as a member of the ecosystem, not an outsider, and take responsibility. Reduce unnecessary consumption, and actively explore the way of green consumption, form a good habit of green consumption. We should reduce our herd mentality, define what we need, and promote green consumption in our spare time while strengthening ourselves, so that more people in the society can join in the practice of ecological civilization.

(2) Colleges and universities need to strengthen the publicity of low-carbon consumption and combine practice with theory. Theoretically, students can be taught the knowledge related to green consumption behavior through classes, lectures, slogans and other ways, so as to make students aware of the necessity of low-carbon life. In practice, we can organize green campus practice activities, establish associations and organizations related to green consumption behavior, and hold knowledge quiz contests related to green consumption.

(3) All sectors of society should work together to create a good environment for green consumption. Use the Internet to publicize more knowledge related to green consumption, increase the popularity of the concept of green consumption, and actively guide college students to carry out green consumption.

(4) Enterprises should also actively develop green products, increase the popularity of green products, reduce the price of green products, and reduce the consumption burden of college students.

References

- [1] Balderjahn I. Personality variables and environmental attitudes as predictors of ecologically responsible consumption patterns[J]. *Journal of Business Research*,1988, 17.
- [2] Cornwell C H S B. Environmental Problems and Marketing | An Examination of Ecologically Concerned Consumers and Their Intention to Purchase Ecologically Packaged Products [J]. *Journal of Public Policy & Marketing*, 1991, 10(2):77-101.
- [3] Heiskanen E, Johnson M, Robinson S, et al. Low-carbon communities as a context for individual behavioural change[J]. *Energy Policy*, 2010, 38(12):7586-7595.
- [4] Wang Jianhua, Zhao Lulu. The impact of environmental literacy on consumers' green consumption behavior[J]. *Journal of Huazhong Agricultural University (Social Science Edition)*, 2021(03):39-50+184-185.
- [5] Ajzen I. The theory of planned behavior[J]. *Organizational Behavior and Human Decision Processes*, 1991, 50(2):179-211.
- [6] Guagnano A, Stern C, Dietz T, et al. Influences on attitude-behavior relationships: A natural experiment with curbside recycling[J]. *Environment and Behavior*, 1995, 27(5): 699-718.
- [7] Hines J M, Hungerford H R, Tomera A N. Analysis and synthesis of research on responsible environmental behavior: A meta-analysis[J]. *Journal of Environmental Education*, 1986, 18(2): 1-8.
- [8] Sia A P, Hungerford H R, Tomera A N. Selected predictor of responsible environmental behavior: An analysis[J]. *The Journal of Environment Education*, 1985/1986, 17(2): 31-40.