ISSN: 2710-0170

Energy Saving, Emission Reduction and Recycling Treatment of Disposable Products in the Post-epidemic Era

-- Based on the Status Quo of Plastic Tubes, Disposable Masks and Takeaway Packaging

Jiahui Yan

School of Accounting, Anhui University of Finance and Economics, Bengbu, China

3127966517@qq.com

Abstract

In the Post-epidemic era, my country's economy has recovered rapidly, and "online" consumption has become the norm. The large-scale use of disposable products such as plastic tubes, disposable masks and takeaway packaging has caused serious environmental pollution and waste of resources, which is in line with my country's long-term potential. Contrary to the strategic goal of sustainable development. Based on the current situation of plastic tubes, disposable masks and takeaway packaging, this project studies the energy saving, emission reduction and recycling treatment of disposable products in the Post-epidemic era, and advocates the concept of green consumption, in order to realize energy saving, emission reduction and resource recycling. , to promote the sustainable development of my country's economy and contribute to the establishment of a friendly society.

Keywords

Disposable Products; Energy Saving and Emission Reduction.

1. Research Background

With the deteriorating global environment, protecting the environment has received increasing attention. The degradation cycle of plastic products reaches more than 200 years. The large amount of landfill of disposable products causes land occupation, which not only changes its pH, reduces soil activity, and reduces agricultural production, but also affects the balance of the entire food ecological chain as animals swallow it unconsciously. Huge destruction, some of which was dumped into the ocean by rain and humans. According to a 2015 report, about 8 million tons of plastic enter the ocean every year, and it will take at least 470 years for it to fully degrade. At the same time, in the Post-epidemic era, my country's economy has recovered rapidly, and "online" consumption has become the norm. The extensive use of disposable products such as plastic tubes, disposable masks and takeaway packaging has caused serious environmental pollution and waste of resources. Due to the low entry threshold, lax supervision, lack of strict hygiene standards and an effective market supervision system, low-quality and cheap disposable products flood the market, often with hidden dangers in health and hygiene, and inadvertently resulting in huge overcapacity.

In this regard, based on the current situation of plastic tubes, disposable masks and take-out packaging, we will study the energy conservation, emission reduction and recycling treatment of disposable products in the Post-epidemic era to promote resource conservation. The use of disposable products is difficult to reduce due to the influence of the current social consumption concept. The replacement of non-degradable disposable products by easily degradable disposable products is the main measure for energy conservation and emission reduction.

ISSN: 2710-0170

Advocate the idea of green consumption and build a resource-saving society and an environment-friendly type. Society is of great significance to the sustainable and healthy development of the national economy.

2. Literature Review

From January 1, 2021, the document "Opinions on Further Strengthening the Control of Plastic Pollution" prohibits the use of non-degradable disposable plastic straws in the catering industry nationwide. In terms of express packaging, Jia Chengfang and Kang Qiuping built a multi-objective path optimization model with a time window for simultaneous distribution and recycling. As for disposable medical masks, Zhao Dongchun and Gao Kuiyong disclosed a personal disposable mask disinfection and reusing machine, which can facilitate the processing of masks after a large number of use; Wang Ruilan and Chen Liying invented the utility model and disclosed a disposable mask. Harmless treatment device.

The Public Health Agency of Canada (PHAC) has begun recommending that people use washable masks made from natural fabrics. Stora Enso used materials and technologies licensed from Sulapac for research and development, and the straw is made of Sulapac biocomposite. Fang Wang (2016) designed a green logistics box and a corresponding direct logistics recycling model by analyzing the characteristics of express packaging in China's e-commerce environment. Japan has formulated the "Packaging Recycling Law" for the greening of express packaging.

3. Establishment of Cognitive Influencing Factors and Model for Energy Saving, Emission Reduction and Recycling of Disposable Products

3.1. Model Selection

The current situation of the shortage of energy saving, emission reduction and recycling treatment of disposable products is a systematic and complex problem, which is determined by many factors. In this regard, we use multiple linear regression to confirm and analyze the influencing factors of energy saving, emission reduction and recycling of disposable products. According to the survey, we found that the recycling rate of disposable products is extremely low, and there is a large deviation in the cognition of the use of disposable products by college students, resulting in a huge waste of resources.

3.2. Preparation of the Model

3.2.1. Multiple Regression, an Introduction to Models

Regression analysis is a quantitative analysis method based on the correlation between variables. By analyzing the sample data, discovering the law of data changes, and then determining the independent variables (explaining variables) and dependent variables (explained variables) to build a model, this process can more accurately reflect the degree of influence of one or more variables on a variable.

The general steps of regression analysis are: first, determine the independent variable (denoted as x) and dependent variable (denoted as y) of the regression equation; secondly, draw a scatter plot, observe the distribution of the scatter plot, and determine the regression model; then, according to the regression The model and the sample data are fitted to the regression equation, and the regression equation is tested; finally, the regression equation obtained by the fitting is used to predict the data change trend. The multiple linear regression model can be used to explain the linear correlation between the explained variable and multiple explanatory variables. The mathematical model can be expressed as:

ISSN: 2710-0170

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \cdots + \beta_\rho x_\rho$$

Among them, y represents the explained variable, $x_1, x_2, x_3, \cdots, x_\rho$ represents p explanatory variables, $\beta_1, \beta_2, \beta_3, \cdots, \beta_\rho$ represents the partial regression coefficient, and ε represents the random error. It can be seen that the linear transformation of the explained variable y can be explained by two parts: the change of p explanatory variables x; the change of ε random factors. Taking the expectation of the mathematical model, the multivariate linear equation is obtained:

$$E(y) = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \cdots + \beta_\rho x_\rho$$

Test methods for multiple linear regression models include:

Goodness-of-fit test for regression equations

The goodness of fit test of the multiple linear regression regression equation can better reflect the fit degree of the fitted straight line to the observed values. R is the correlation coefficient between the independent variable and the dependent variable. The closer R2 is to 1, the higher the goodness of fit.

Residual Analysis

The residuals in the multiple linear regression model can better reflect the difference between the predicted value calculated by the fitted regression equation and the actual sample value. The independence of the residuals can be tested by the Durbin-Watson statistic. If the Durbin-Watson statistic is between 1.5 and 2.5, the residuals are independent of each other.

3.2.2. Values of Indicators

Ecological Environment Cognition (X1)

The ecological environment is closely related to the energy saving, emission reduction and recycling treatment of disposable products. However, college students do not have a clear numerical understanding of the energy saving, emission reduction and recycling treatment of disposable products. Generally speaking, the higher the level of awareness of the ecological environment, the more likely it is to implement the recycling of disposable products. Based on this analysis, the research hypothesis H1 is proposed.

H1: The impact of ecological environment cognition on the recycling of disposable products is positive. The higher the level of college students' awareness of the ecological environment, the more they expect the recycling of disposable products.

Cost participation awareness (X2)

At present, most students in our country are not aware of the recycling of disposable products, and their awareness of cost participation is not high.

H2: The impact of college students' awareness of cost participation on the recycling of disposables is positive. The higher the awareness of college students' cost participation, the more they expect to implement recycling of disposables.

Involvement (X4)

Although college students are aware of the recycling of disposable products, their participation is not high. Although disposable products have been recognized by most students, there are still some students who have a negative attitude towards it, and even regard disposable products as public property. Take a negative attitude.

H3: The degree of involvement has a positive impact on the recycling of disposable products. The higher the degree of involvement, the more students expect disposable products, and the more likely they are to implement recycling of disposable products.

Expectation (X5)

ISSN: 2710-0170

The higher the awareness level of college students' awareness of the cost of recycling disposable products, the more they fully understand the economic and practical significance of recycling, the more willing they are to use disposable recycling products and actively participate in the recycling of disposable products. The degree is also higher.

H4: Cost participation perception affects the recycling of disposables by affecting the degree of involvement. The higher the level of cognition, the higher the degree of involvement, the more the college students are expected to use disposable products, and the more likely they are to recycle disposable products.

3.3. Model Establishment

3.3.1. Design of the Model

Computing the Elementary Loading Matrix

Calculate the correlation coefficient Calculate the eigenvalues and eigenvectors of the correlation coefficient matrix R: $\lambda_1 \geq \lambda_2 \geq \lambda_3 \geq \cdots \geq \lambda_p \geq 0, \mu_1, \mu_2, \cdots, \mu_p$ where $\mu_j = [r_{1j}, r_{2j}, \cdots, r_{pj}]$ The elementary loading matrix can be expressed as

$$\Lambda_1 = [\sqrt{\lambda_1\mu_1}, \sqrt{\lambda_2\mu_2}, \sqrt{\lambda_3\mu_3}, \cdots, \sqrt{\lambda_p\mu_p}]$$

Choose m (m≤p) main factors

Calculate the contribution rate of common factors, and select m common factors as the main factors. Calculate the rotation factor loading matrix to get the matrix $\Lambda_2 = \Lambda_1^m T$ (where Λ_1^mm is the first m columns of Λ_1, and T is an orthogonal matrix).

Construct the factor model:

$$\begin{cases} x_1 = a_{11}F_1 + a_{12}F_2 + \cdots + a_{1m}F_m \\ \vdots \\ x_p = a_{p1}F_1 + a_{p2}F_2 + \cdots + a_{pm}F_m \end{cases}$$

$$\begin{bmatrix} a_{11} & \cdots & a_{1m} \\ \vdots & \ddots & \vdots \\ a_{p1} & \cdots & a_{pm} \end{bmatrix}$$

Calculate factor scores

Use regression to find the factor score function:

$$\hat{F}_j = \beta_{j1}x_1 + \beta_{j2}x_2 + \cdots + \beta_{jp}x_p$$

Note the estimated value of the i-th sample point for the j-th factor Fj score:

$$\hat{F}_{ij} = \beta_{j1}x_{i1} + \beta_{j2}x_{i2} + \cdots + \beta_{jp}x_{ip}$$

$$\begin{bmatrix} \beta_{11} & \cdots & \beta_{1m} \\ \vdots & \ddots & \vdots \\ \beta_{p1} & \cdots & \beta_{pm} \end{bmatrix}$$

And $\hat{F} = (\hat{F}_{ij})_{k*m} = X_0 R^{-1} \Lambda_2$, where , $X_0 = (a_{ij})_{k*p}$is the normalization matrix of the original k samples; R is the correlation matrix,Λ2 is the loading matrix.

ISSN: 2710-0170

3.3.2. Solution of the Model

Use SPSS software to process and analyze the collected data, and analyze the influencing factors of students' expectations for the recycling of disposable items:

Table 1. The results of multiple regression analysis of the cognitive influencing factors of college students' disposable products recycling

Model	R	R-square	Adjust R-square	standard estimate error
1	.950a	0.902	0.899	0.274

a. Predictor variables: (constant), degree of involvement, willingness to reuse, awareness of environmental protection, awareness of waste of disposables, price factor.

b. Dependent Variable: Expectation

Table 2. Analysis of variance table

Model		sum of square	df	mean square	F	Sig.
1	return	134.371	5	26.874	358.352	.000a
	residual	14.624	195	0.075		
	total	148.995	200			

Table 3. Contingency synthesis table

Model		Unstandardized coefficients		Standard coefficient	t	Sig.	Collinearity Statistics	
		B	standard error	trial version			Tolerance	VIF
	(constant)	-0.354	0.108		-3.274	0.001		
	Environmental awareness	0.187	0.044	0.187	4.235	0	0.259	3.856
	Disposable waste awareness	0.323	0.044	0.328	7.419	0	0.257	3.888
	price factor	0.168	0.045	0.165	3.73	0	0.257	3.898
	Willingness to use the second time	0.16	0.037	0.157	4.378	0	0.393	2.543
	Involvement	0.21	0.031	0.24	6.691	0	0.392	2.549

Table 4. Collinearity diagnosis

Model	dimension	Eigenvalues	conditional index	Variance ratio					
				(constant)	Environmental awareness	Disposable waste awareness	price factor	Willingness to use the second time	Involvement
1	1	5.922	1	0	0	0	0	0	0
	2	0.03	13.986	0.67	0	0.02	0	0.01	0.2
	3	0.02	17.005	0.29	0.1	0	0.02	0.1	0.44
	4	0.012	21.824	0.04	0.09	0.26	0	0.61	0.11
	5	0.008	26.501	0	0	0.3	0.76	0.24	0
	6	0.007	29.826	0	0.81	0.41	0.21	0.04	0.25

ISSN: 2710-0170

Combined with the regression analysis results, it can be seen that R2 is 0.902, which reflects the students' expectation and involvement in the recycling of disposable products, their willingness to reuse, environmental protection awareness, and the price factor. The variance explained by the fitting equation accounts for the proportion of the total variance of the explanatory variables. 90.2%, the fitting effect of the model is good.

In the ANOVA analysis, F=358.352, rejecting the null hypothesis, indicating that the relationship between the explained variable and the explanatory variable is significant, and the multiple linear regression model can be used to describe and reflect the relationship between them.

In collinearity statistics, the allowable values of independent variables are 0.259, 0.257, 0.257, 0.393, and 0.392, which are all within the reasonable range of 0-1.

According to the standard coefficient β in the coefficient table, a linear regression equation is fitted:

Expectation for recycling of disposable products = 0.187 * environmental protection awareness + 0.328 * awareness of waste of disposable products + 0.165 * price factor + 0.157 * secondary utilization intention + 0.031 * degree of involvement

It can be seen that the β value of expectation and involvement, willingness to reuse, environmental protection awareness, price factor, waste awareness and involvement of disposable products is greater than 0, that is, it has a positive impact. In addition, the β value of the waste awareness of disposable products is 0.328, which is the highest among the standard coefficients, indicating that the waste awareness of disposable products has a greater impact on the expectation of recycling of disposable products than other influencing factors.

3.3.3. Conclusion of the Model

Combined with the actual survey data, a multiple linear regression model was constructed based on factor analysis, which proved the influence of five aspects of the expectation of recycling of disposable products, namely environmental protection awareness, awareness of waste of disposable products, price factors, willingness to reuse, volume in-degree. Therefore, we should proceed from our own actual situation, adopt different strategies, and make full use of the five aspects of environmental protection awareness, awareness of waste of disposable products, price factors, willingness to reuse, and involvement in the recycling of disposable products. The characteristics of expectations, the use of influencing factors, through schools or the government to pilot the strategy of recycling disposable products, attract the attention of college students, which has a positive significance for solving the current situation of waste of disposable products.

4. Conclusion

The recycling of disposable products is a concrete manifestation of practicing the "people-oriented" scientific development concept and building a resource-saving and environment-friendly society. It is a beneficial action to develop a green economy and save energy. This article Based on the status quo of plastic tubes, disposable masks and takeaway packaging to understand the energy saving, emission reduction and recycling of disposable products in the Post-epidemic era, and to analyze students' perceptions of the recycling of disposable products. Compared with the utilization of foreign disposable products, the waste of domestic disposable products is astonishing. Realizing the recycling of disposable products is a win-win for ecology and economic benefits, but realizing this situation as soon as possible not only requires schools and students to change their traditional concepts, but also requires efforts from all parties in the society.

The single-use product recycling market lacks a complete platform and service system support, the inefficient matching between supply and demand, and the imperfection of relevant policies

ISSN: 2710-0170

and regulations are all "stumbling blocks" on the road to realizing the recycling of single-use products. Eliminating the waste of disposable products is a necessary part of building a conservation-minded society. However, the change of concept requires the joint efforts of students, parents, schools, publishing houses and education departments. It is expected that all parties will work together to develop a feasible plan to realize the recycling of disposable products, so that the problem of waste of disposable products can be completely solved.

Acknowledgments

Supported by the Innovation and Entrepreneurship Training Program of Anhui University of Finance and Economics (S202110378505).

References

[1] Li Huan, Zhu Long, Shen Qian, He Yanan, Deng Yixiang, An Lihui. Policy Analysis and Suggestions on the Prevention and Control of Plastic Pollution in my country [J/OL]. Environmental Science: 1-9 [2022-04-15]. DOI: 10.13227/ j.hjkx.202112268.

[2] Li Zhuoran, Ji Min, Zhao Yingxin, Zhou Xu, Yang Zhifan. Visual analysis of global microplastics research status and hotspots[J/OL].Environmental Chemistry:1-13[2022-04-15].http:// kns . cnki. Net / kcms/detail/11.1844.X.20220329.1355.020.html.

[3] Xiang Jiangtao, Yang Xiaokui, Yang Xiaoran, Wu Shuai, Zhang Shiyan. Rapid evaluation method for low-pressure and low-temperature climate environment adaptability of ABS plastics [J]. Equipment and Environmental Engineering, 2022,19(02):85-90.