Research on the Impact of Green Consumption on Building a New Development Pattern in Rural Areas

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Abstract. This study aims to investigate the impact of green consumption levels on the construction of a new development pattern in rural areas, quantifying the level of green consumption and development potential in each province through the construction of an indicator system. Finally, by analysing and comparing the level of green consumption and development potential in rural areas, conclusions with theoretical and practical implications are drawn in relation to reality and policy.

Keywords: green consumption · rural revitalization · rural economics

1 Introduction

At present, China's rural economic and ecological development is facing certain obstacles, and it is urgent to make changes in production and life. Green consumption can balance ecological and economic development and give new impetus to rural development. It is of theoretical and practical significance to study the relationship between green consumption levels and rural development.

2 Empirical Analysis

2.1 Entropy-Based Approach to Measuring Green Consumption Levels and Rural Development Potential

The construction of a green consumption indicator system in China must be able to reflect the overall status and level of green consumption, while at the same time implementing as well as promoting green consumption on the basis of relevant work at home and abroad. The indicator system must include both outcome and process indicators.

In this paper, the indicator system is constructed with reference to the methodology of Yu Hai, Wang Yong, Li Jifeng and Ren Yong, and the indicator system needs to broadly cover the green consumption chain and the whole process. Among them, the supply of green products mainly influences the impact of subsequent consumption on resources and the environment through the production process and the proportion of

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Table 1. Green Consumption Evaluation Indicator System

Dimensions	Indicators	Indicator Meanings
Overall indicators	Air Quality	CO_2 emissions per capita per $10,000 of consumption expenditure (kg)
	Energy Consumption	Electricity consumption (billion kWh)
Traveling	Green Travel	Public transport vehicles per 10,000 people (standard units)
Spending	Water Conservation	Daily domestic water consumption per capita per 10,000 yuan of consumption expenditure (litres)
	Use Of Waste	Daily domestic waste removal per capita per 10,000 yuan of consumption expenditure (kg)
Living	Eco-living	Urban greenery coverage (%)
	Green Sport	Green space per capita (m^2)

The table is drawn by the author.

green products. The consumption process mainly includes key areas such as housing, use and transport. Combining the above views and the data availability of indicators, the green consumption evaluation indicator system for each province in China is shown in Table 1.

This paper analyses the green consumption levels of 30 provinces (autonomous regions and municipalities) in China. The data comes from the 2012–2020 China Statistical Yearbook, the China Carbon Accounting Database and the Provincial Statistical Yearbooks. Where the CO2 emissions of CEADs are calculated in accordance with the IPCC calculation method, i.e. based on energy consumption data and emission factors. For missing values in the raw data, estimates were made based on historical data and common sense combined with linear interpolation.

The basic idea of entropy weighting method is to determine the target weights according to the variability of the indicators. The entropy weighting method is used to determine the weights of each indicator as a way to ensure that the results are objective and accurate.

The calculation steps in this paper are as follows:

1. Standarisation of raw data

Since the evaluation indicators in green consumption are different in nature and usually differ in terms of dimensionality and order of magnitude, this paper adopts a standardization method to process the raw data in order to eliminate the differences.

2. Determination of indicator weights

The entropy weighting method determines the weights of indicators according to the amount of information conveyed to decision makers, which enhances the objectivity of indicator evaluation. It uses the weight of indicators, information entropy, information entropy redundancy and weights to calculate.

The Results of the evaluation of green consumption levels by province nationwide are shown in Table 2.

Table 2. Green consumption level scores by province

Years	2012	2013	2014	2015	2016	2017	2018	2019	2020
Provinces	Scores								
Bei Jing	0.706	0.733	0.804	0.821	0.849	0.892	0.834	0.844	0.764
Tian Jin	0.415	0.442	0.428	0.443	0.488	0.565	0.445	0.436	0.456
He Bei	0.296	0.317	0.323	0.342	0.360	0.385	0.381	0.374	0.394
Shan Xi	0.271	0.301	0.308	0.311	0.334	0.339	0.353	0.373	0.391
Nei Meng Gu	0.359	0.380	0.417	0.423	0.451	0.459	0.432	0.458	0.465
Liao Ling	0.411	0.419	0.430	0.444	0.429	0.453	0.433	0.457	0.494
Ji Lin	0.372	0.369	0.407	0.419	0.438	0.420	0.447	0.438	0.455
Hei Long Jiang	0.398	0.396	0.393	0.395	0.405	0.416	0.421	0.433	0.431
Shang Hai	0.476	0.481	0.438	0.450	0.461	0.519	0.473	0.466	0.513
Jiang Su	0.385	0.396	0.426	0.449	0.467	0.492	0.469	0.481	0.491
Zhe Jiang	0.432	0.448	0.477	0.499	0.514	0.514	0.513	0.521	0.490
An Hui	0.289	0.312	0.336	0.347	0.371	0.403	0.400	0.412	0.408
Fu Jian	0.394	0.422	0.437	0.457	0.476	0.519	0.538	0.557	0.531
Jiang Xi	0.363	0.356	0.342	0.350	0.366	0.425	0.405	0.421	0.424
Shan Dong	0.353	0.368	0.365	0.406	0.434	0.451	0.441	0.459	0.437
He Nan	0.218	0.236	0.255	0.269	0.292	0.329	0.346	0.369	0.384
Hu Bei	0.315	0.328	0.333	0.354	0.373	0.379	0.380	0.389	0.435
Hu Nan	0.252	0.273	0.304	0.337	0.371	0.379	0.405	0.432	0.433
Guang Dong	0.441	0.438	0.446	0.471	0.492	0.523	0.524	0.534	0.510
Guang Xi	0.234	0.251	0.261	0.270	0.286	0.319	0.336	0.341	0.337
Hai Nan	0.373	0.403	0.424	0.410	0.443	0.483	0.477	0.504	0.503
Chong Qing	0.435	0.456	0.446	0.460	0.473	0.489	0.475	0.488	0.507
Si Chuang	0.303	0.329	0.324	0.347	0.361	0.391	0.393	0.418	0.419
Gui Zhou	0.200	0.248	0.274	0.303	0.341	0.349	0.365	0.385	0.409
Yun Nan	0.278	0.286	0.307	0.314	0.344	0.353	0.361	0.364	0.377
Shan Xi	0.379	0.389	0.412	0.423	0.423	0.388	0.414	0.418	0.420
Gan Su	0.243	0.291	0.283	0.282	0.315	0.349	0.357	0.380	0.404
Qin Hai	0.347	0.335	0.354	0.345	0.368	0.372	0.438	0.440	0.464
Ning Xia	0.458	0.478	0.493	0.519	0.505	0.537	0.537	0.554	0.548
Xin Jiang	0.357	0.363	0.379	0.402	0.408	0.413	0.426	0.417	0.407

The table is drawn by the author.

The growth rates over the years show that the overall national green consumption development potential has slightly increased over the past nine years, with an average annual growth rate of 3.50%; it is worth noting that the green consumption level developed rapidly from 2012 to 2017, but the growth rate It is worth noting that the level of green consumption developed rapidly from 2012 to 2017, but the growth rate fluctuated, falling from 12.22% in 2013 to 4.3% in 2017, and half of the provinces in the country showed negative growth in 2018.

2.2 Measurement of the Rural Development Potential Indicator System

Under the new development pattern of rural areas, high-quality development is a dynamic process that evolves and advances through a mechanism of "endogenous dynamics" driving "external performance". On this basis, this paper refers to the method of Song Yang and Li Xianjun and constructs an evaluation indicator system for the new rural development pattern, which is measured for 30 provincial administrative regions in China (Tibetan region is seriously missing data). Combining the above ideas and the data

Table 3. System of indicators of rural development potential

Dimensions	Indicators	Indicator Meanings
External Performance	Economic Performance	Gross regional product per capita in rural areas
	Coordinated Development	Ratio of consumption expenditure
		Ratio of income between rural and urban residents
		Ratio of rural to urban car ownership per 100 households
	Living Standard	Disposable income per rural resident
		Per capita consumption expenditure of rural residents
		Average household car ownership per 100 rural households
Endogenous Dynamics	Ecological Civilisation	Water resources per capita
		Fertilizer application for agricultural use
		Forest coverage rate
	Resource Security	Medical and health institutions
		Number of rural cable radio and TV subscribers
		Number of rural residents with minimum living standards

The table is drawn by the author.

availability of the indicators, the following new development pattern indicator system was established, as shown in Table 3.

This paper uses the China Statistical Yearbook and Rural Statistical Yearbook from 2012 to 2020 to select indicator data from 30 provinces (autonomous regions and municipalities) in mainland China over a nine-year period to analyse the national level of green consumption.

Calculations are carried out using the entropy weighting method. The results of the evaluation of rural development potential by province as shown in Table 4.

The results show that in the past nine years, the overall development potential of green consumption in China has been slightly improved, with an average annual growth rate of 3.50%. Among them, the level of green consumption developed rapidly from 2012 to 2017, but the growth rate fluctuated greatly, dropping from 12.22 percent in 2013 to 4.3 percent in 2017, and half of the provinces in China experienced negative grow.

2.3 Systematic GMM Dynamic Regression Analysis

Considering that the green consumption variable itself has inertia and is susceptible to the results of the previous period. Based on the above possibilities, this paper uses a dynamic panel model to perform optimal estimation of the relevant parameters and ensure that the endogeneity problem of the model is effectively addressed.

In this paper, a systematic GMM dynamic regression model will be chosen. The following panel model was developed to investigate the relationship between green consumption and rural development potential.

$$Y_{it} = \alpha_1 + \beta_1 X_{i,t-1} + \beta_2 INV_{it} + \beta_3 TEC_{it} + \beta_4 DP_{it} + \beta_5 EDU_{it} + \beta_6 GOV_{it} + \varepsilon_{it} \tag{1}$$

INV denotes fixed asset investment and the price index of fixed asset investment; TEC denotes the intensity of investment in research and experimental development (R&D), indicating the potential of scientific and technological development; DP denotes the degree of openness to the outside world and the ratio of the total import and export of the location of the operating unit to the per capita GDP; EDU denotes education expenditure and the ratio of the local financial expenditure on education to the per capita GDP; GOV denotes government expenditure on education. The ratio of local fiscal expenditure on education to GDP per capita is used; GOV indicates the degree of government intervention.

This paper uses a systematic GMM dynamic regression model to analyse the different effects of green consumption on the rural development potential bureau (Table 5).

From the results, the Sargan test indicates that the instrumental variables were chosen to be valid. The first-order serial autocorrelation is significant and the second-order serial autocorrelation is not significant with a p-value greater than 0.1, indicating that the model setting in this paper is reasonable. The results show that the promotion effect of green consumption on the new rural development pattern is more significant. The regression coefficients of investment in fixed assets (INV), degree of openness to the outside world (DP), education expenditure (EDU) and degree of government intervention (GOV) all

Table 4. Rural development potential scores by province

Years	2012	2013	2014	2015	2016	2017	2018	2019	2020
Provinces	Scores								
Bei Jing	0.248	0.287	0.327	0.329	0.362	0.385	0.430	0.447	0.457
Tian Jin	0.189	0.238	0.272	0.289	0.314	0.331	0.311	0.325	0.332
He Bei	0.243	0.269	0.296	0.303	0.328	0.327	0.354	0.363	0.378
Shan Xi	0.158	0.170	0.186	0.191	0.201	0.204	0.223	0.224	0.234
Nei Meng Gu	0.181	0.229	0.232	0.242	0.252	0.258	0.260	0.272	0.289
Liao Ling	0.202	0.223	0.230	0.241	0.261	0.267	0.276	0.285	0.299
Ji Lin	0.194	0.227	0.239	0.250	0.266	0.269	0.276	0.287	0.321
Hei Long Jiang	0.192	0.233	0.222	0.233	0.244	0.255	0.269	0.300	0.322
Shang Hai	0.172	0.203	0.233	0.252	0.284	0.310	0.336	0.370	0.384
Jiang Su	0.326	0.353	0.380	0.393	0.394	0.397	0.388	0.399	0.396
Zhe Jiang	0.379	0.406	0.442	0.479	0.500	0.503	0.506	0.527	0.533
An Hui	0.159	0.188	0.211	0.229	0.253	0.258	0.292	0.306	0.336
Fu Jian	0.307	0.317	0.340	0.350	0.400	0.389	0.394	0.425	0.419
Jiang Xi	0.289	0.291	0.311	0.316	0.354	0.349	0.354	0.382	0.382
Shan Dong	0.291	0.343	0.297	0.359	0.372	0.381	0.403	0.427	0.447
He Nan	0.192	0.224	0.244	0.255	0.282	0.287	0.301	0.314	0.328
Hu Bei	0.230	0.247	0.264	0.283	0.314	0.314	0.345	0.355	0.395
Hu Nan	0.246	0.263	0.283	0.306	0.334	0.340	0.330	0.354	0.367
Guang Dong	0.283	0.309	0.291	0.296	0.320	0.357	0.391	0.418	0.428
Guang Xi	0.224	0.235	0.252	0.275	0.286	0.292	0.305	0.335	0.348
Hai Nan	0.173	0.205	0.204	0.195	0.239	0.231	0.256	0.245	0.259
Chong Qing	0.170	0.186	0.214	0.218	0.240	0.252	0.259	0.276	0.310
Si Chuang	0.303	0.320	0.327	0.326	0.334	0.346	0.378	0.397	0.412
Gui Zhou	0.152	0.147	0.190	0.203	0.214	0.246	0.281	0.312	0.329
Yun Nan	0.171	0.186	0.207	0.217	0.235	0.259	0.290	0.287	0.313
Shan Xi	0.176	0.195	0.213	0.223	0.241	0.255	0.274	0.290	0.297
Gan Su	0.093	0.114	0.123	0.129	0.143	0.150	0.185	0.196	0.194
Qin Hai	0.274	0.255	0.304	0.272	0.297	0.353	0.381	0.409	0.446
Ning Xia	0.091	0.118	0.137	0.146	0.160	0.188	0.205	0.208	0.221
Xin Jiang	0.139	0.161	0.162	0.173	0.197	0.198	0.194	0.213	0.216

The table is drawn by the author.

Table 5. GMM modeling results

Variables	Explained variable X	Variables	Explained variable Y
X	0.001*** (3.26)	GOV	0.004*** (2.9)
INV	0.000*** (−4.29)	CONSTANT	0.000*** (8.23)
TEC	0.452 (0.75)	N	270
DP	0.000*** (4.21)	AR (1)	0.0049
EDU	0.000*** (5.35)	AR (2)	0.183

The table is drawn by the author.

pass the significance test. Therefore, green consumption, openness to the outside world (DP), education expenditure (EDU), and government intervention (GOV) also play a role in promoting rural development.

3 Conclusions

Firstly, according to the green consumption level and development potential score of each region, we know that China's green consumption level has been improving. However, there is a great imbalance in the regional distribution.

Secondly, the results of this paper also show that green consumption has a significant role in promoting the level of rural development. Considering the regional and uneven nature of green consumption and rural development potential pointed out in the analysis, policy formulation should be tailored to local conditions, taking into account the coordination between and within regions.

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