***DYNAMIC DEVELOPMENT OF REGIONAL SOCIAL ECONOMY-ENERGY-ENVIRONMENT IN CHINA***

Fang Hong, School of Economics and Management, Beihang University, +8680339023,

fanghong@buaa.edu.cn

Li Jing, School of Economics and Management, Beihang University, +8680339023，

Jinglibuaa@yeah.net

## Overview

In the 21st century，the global is facing many ecological problems, such as ecological environment deterioration, scarcity of resources, and energy crisis. It has been a key problem coordinating the relationship between economy, energy and environment to ensure the sustainable development of human society in the world. Sustainable development is the result of reflection of human being during the process of industrialization where a series of economic, social and environmental problems are produced, especially the regional and global ecological damage caused by the pollution of environment, and how to make a rational choice in the imbalances of the economy-energy-environment. Therefore, economic and social development and protection of energy and environment are interdependent parts in the sustainable development. In addition, China formally put forward sustainable development in March, 1994, then pushed forward the comprehensive development of the three, and achieved remarkable results. However, with the development of China's economy and society, the improvement of environment and energy is no follow up, especially environmental pollution has become increasingly prominent. It has become the focus of scholars that how to realize the synchronous coordination of economy-energy-environment and promote China's sustainable development.

On the basis of existing literatures, there are still pending issues. For example, research objects are focused on some regions, provinces, cities or counties, while, the research on China's overall scope is less. Besides, society is independent variables in many researches, but generally the economy and society are unified into one system variable in the study. Therefore, this article will study the coordination of social economy, energy and environment.

The relationship among the social economy, energy and environment is formed from the dynamic intercoupling of numerous factors in the regional system in all aspects. There are some evolvement rules to be followed. Coupling coordination mechanism is of great significance to improve regional harmonious development. The theory of coupling coordination is introduced in this paper to the field of regional development of social economy, energy and environment. It measures and evaluates the coordination state of social economy, energy and environment in China from 2008-2015 in the terms of sustainable development, with building the evaluation index system of social economy-energy-environment and the coupling coordination model. Thus, the consequences will provide a theoretical basis and practical reference for the construction of regional coordinated development.

## Methods

In the first place, we built an evaluation index system of social economy, energy and environment during 2008-2015 in China. Then the entropy method is adopted to calculate the indexs weight. On that basis, the primary data is standardized by using the biggest-minimum value method. Afterwards, Socioeconomic evaluation index(SE), energy evaluation index(EY) and environmental evaluation index(ET) are obtained after multiplying the standardized value of each selected factor and their weight value and then carry on accumulatio.

Furthermore, we calculate calcoupling coordination degree(D) among the three: $D=\sqrt{C\*T}$, where C represents degree of coupling, $ C=3\*\left\{\frac{SE\*EY\*ET}{\left[SE+EY+ET\right]^{3}}\right\}^{1/3}$, and T is harmonic index, $T=a\*SE+b\*EY+c\*ET$(a=b=c=1/3). We further investigate inter restricted relationship among the three, using Liao’s research for reference.

## Results

Social economy, energy, environment is broadly coordinated though the overall coordination degree is low in China. The coupling coordination degree is the best in in eastern China whose average value is 0.66 belonging to primary coordinated coupling. While, the coupling coordination degree is very close in in central and western China, and the degree is slightly larger in the central region than that in the west. Generally, the degrees decrease in sequence in the east, middle and west of China. In addition, the coordination has been stable in the east during 2008-2015, when it is gradually improving in the middle and the west. Furthermore, the development of energy and environment lags behind economic development to a certain extent in the east. Nevertheless, the economy falls behind the energy and environment in the middle and the west, which are relatively rich in resources and have better environmental quality except Shanxi and Inner Mongolia having abundant coal resources.

## Conclusions

The paper aims to explore the relationships among social economy, energy and environment in China. Through the construction and quantification of the evaluation system, which consists of social economy, energy and environment subsystems, this paper uses the coupling coordination model to analyze the relationships among social economy, energy and environment of all regions in China from 2008 to 2015.

The results showed that the development of social economy, energy and environment of China are basically coordinated overall, while the coordination degree is relatively low. The coupling coordination degree of social economy-energy-environment of eastern China changed gently, which is better than the degrees in the central and western parts of China. The degrees in these regions tend to be increasing, however, dynamic fluctuation could be observed. The developed provinces and cities of eastern China are densely populated, with higher level of economy and social progress. To a certain extent, the development of energy and environment is lagging behind in these areas. Besides Shanxi and Inner Mongolia, which have the lower environmental quality, the other provinces and cities in the central and western regions with lower population density and richer resources tend to have relatively higher environmental quality. Lower level of economic development is the problem faced by most of the central and western provinces. In order to further enhance the coordinated development level of social economy, energy and environment of China, it is quite necessary to revise the lagging factors in the process of coordinated development of regional systems from different regional perspectives.

## References

[1]Brock W A, Taylor M S. Economic growth and the environment: a review of theory and empirics[J]. Handbook of economic growth, 2005, 1: 1749-1821.

[2]Cao G H, Wang F, Zhang Z Y, et al. Relationship Between Pollution and Economic Growth in China[J]. China Population, Resources and Environment, 2006, 16(1): 25-29.

[3]Wu Y M, Zhang Y. Analyzing Coupled Regional Economic Growth and Environmental Conservation in China[J]. Resource Science, 2008, 30(1): 25-30.

[4]Jia Y H, Zhao J, Nan Z R, et al. Ecological safety assessment of grassland based on entropy-right method:A case study of Gansu pastoral area[J]. Chinese Journal of Ecology, 2006, 25(8):1003-1008.

[5]Liao C B. Quantitaitve judgement and classification system for coordinated development of environment and economy-a case study of the city group in the Pearl River Delta[J]. Teopical Geography, 1999, 19(2): 171-177.