

## **RESEARCH ON THE ECOLOGICAL ECONOMY MODELS OF SUSTAINABLE DEVELOPMENT**

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### **ABSTRACT**

Sustainable development is to meet the needs and aspirations of the present without compromising the ability to meet those of the future. Several new economy models are presented, including green economy, circular economy, industrial ecological system, etc. The paper discusses the definition and essential meaning of such economy models, and then studies the policies to carry on such ecological economies to realize sustainable development.

**Keywords:** Sustainable development, Green economy, Circular economy, Industrial eco-system

### **1. INTRODUCTION**

Since 1960s, global environment pollution and ecology destruction have been more and more serious following the industrialization and growth of the world economy. The conflict between industrial undertakings and the world environment is more severe than before. People have begun to rethink and review traditional values and development concepts, realizing that the traditional economic development model will aggravate the predatory exploitation of resources and seriously damage the environment. The sustainable development strategy cannot follow the traditional model with large input, high consumption and serious pollution; it must turn into small input, low consumption and light pollution. Defining the sustainable even the term “sustainable” is not the only one used, terms such as “responsible”, “greening”, “environmentally friendly”, “corporate social responsibility”, “ecology” and “eco-friendly” are interchangeably mixed in with “sustainable”. Sustainable development is to meet the needs and

aspirations of the present without compromising the ability to meet those of the future. That is to say, while we achieve the goal of economic development, natural resources such as atmosphere, fresh water, ocean, land and forest that mankind depends on for existence should be protected for descendants to develop, live and work in peace and contentment forever.

In order to achieve sustainable development, several economy models are presented here, in the followings we first discuss the definition of the ecological economy models, then study the policies to carry on such ecological economy models to realize sustainable development.

## **2. SOME ECONOMY MODELS OF SUSTAINABLE DEVELOPMENT**

Sustainable development advocates that production activities should be conducted to best suit the natural status, the relationship between mankind and nature becomes more harmonious and unified by the following economic developing ways.

### **2.1 Green economy**

Although the origins and essential foundations of green economy may be traced to the popularization of environmental concerns in advanced industrial society in the late 1960s and 1970s (Harper-Anderson 2012), green economy was first expressly invoked in the 1989 piece Blueprint for a Green Economy (Pearce et al. 1989). Michael Jacobs also employed the term in his 1991 book entitled “The green economy: Environment, sustainable development and the politics of the future”. By the mid-1990s, labour union representatives explicitly called for recognition of the potential of “green jobs” to boost national and global economies (Stavis and Felli 2014). Despite these efforts, however, the concept did not achieve wide usage. Ecological modernization gained popularity in the late 1990s (e.g. Mol 1996) as a needed qualification of business-as-usual global capitalism. This discourse entailed an emphasis on technological innovation to production techniques as a means of enhancing the environmental sustainability of economic activity.

### **2.2 Low-carbon economy**

Global warming has become an increasingly important political and business issue for most countries. There have been strong calls from environmental, business and political leaders to respond to the myriad of challenges that the threat of global warming brings. One part of the challenge is the need for entities to understand and communicate their contribution to global warming resulting from carbon emissions. Presumably, the rationale for this understanding is that greater awareness of the scope of the problem will likely lead to more environmentally responsible decision-making.

More recently, studies such as Frost (2007), Simnett and Nugent (2007) and Cowan examine the environmental and carbon emission disclosures of selected Australian companies. The previous studies are based on a period prior to the recent widespread public discussion and interest in climate change and carbon emissions. Since the introduction in mid-2007 of a mandatory reporting system, the National Greenhouse and Energy Reporting Act (the NGER Act), there has been a significant increase in public awareness of climate change and carbon emissions. Such changes in social and regulatory environments provide an opportunity to investigate how Australian companies have reacted to those changes.

### **2.3 Circular economy**

Circular economy is a kind of “resource-product-renewable resources” mode of economic growth and it is also a kind of social production and reproduction activity which has the basic characteristics of high efficiency and recycling utilization of resources. The circular economy operating principles are embodied in “Reduce, Reuse, Recycle,” which is simply called ‘3R’ principles. “Reduce” requires achieving the purpose of certain production or consumption with less raw materials and energy, which can reduce the pollution by saving resources in the beginning of economic activities; “Reuse” requires the repeated using of the production and the package of products in the form of circulation in order to extend the working life of products and service, and reducing the waste in the production and consumption process. This principle can prevent the products from being rubbish prematurely; “Recycle” requires production to become resources again after finishing its using function in order to reduce the final amount of waste and relieve the pressure of garbage disposal. According to the concept of circular economy, the “3R” principles can be looked as an organic unity. The fundamental goal of it is to reduce the adverse effect on the environment in economic activities, to avoid or reduce the destruction of resources in economic activities and to make the treatment of waste become harmless, reduced, and recycled, so as to realize the coordinated development of economy and environment.

### **2.4 Industrial eco-system**

Industrial ecology is an interdisciplinary framework for designing and operating industrial systems as living systems interdependent with natural systems. It seeks to balance environmental and economic performance within emerging understanding of local and global ecological constraints. Some of its developers have called it "the science of sustainability". Industrial ecology helps companies become more competitive by improving their environmental performance and strategic planning. It helps communities develop and maintain a sound industrial base and infrastructure without sacrificing the quality of their environments. Industry ecology is to realize the harmonious development between economy and nature ecology by

planning industrial systems according to material cycle in the natural ecological system, and to establish the circular economy mode of “resources-products-renewable resources”.

An industrial eco-system can reduce the usage of raw materials, reduce pollution, increase energy efficiency, decrease greatly the amount of waste from the production process, slow down the pace of the earth becoming full (H. E. Daly, 2004) , and fundamentally solve the contradiction between the economy growth and the ecological environment in the development of a region.

### **3. STRATEGIES OF DEVELOPING THE SUSTAINABLE ECONOMY MODELS**

To achieve sustainable development, it contains not only the establishment of the ecological viewpoint of administration, ecological values, but also the production methods of energy conservation, waste reduction, construction of a resource-conservative and a recycle-typed economical growth, etc.

#### **3.1 Inherit and promote eco-ethics**

The integration of ecological ethics and the modern ethics is a rational choice for the reservation of ecology and the harmonious development. The shared prosperity and a harmonious society of ecological civilization have to be ultimately achieved based upon the ecological ethics from people through the absorption of the theory of modern science to fit their specific situations. With the development of society, people have been unable to adapt to ecological ethics in pursuit of a modern society for the purpose of maximizing the economic benefits of large-scale material production activities. Therefore, the inheritance of traditional eco-ethics from minorities must be uplifted so that it is built on the basis of modern science.

The eco-ethics of Chinese people do well on cultivating "sense of eco-citizens". The development of "sense of eco-citizens" is responsible for the "civic responsibility" in solving ecological problems in a fundamental way.

#### **3.2 Adjust the internal structure of the secondary industry**

According to the analysis, the key point to reduce energy consumption lie in decreasing proportion of heavy industry in the secondary industry, especially highly energy dependence and serious pollution industry, such as cement industry, building material industry, petrochemical industry, while encouraging newly industry development. These industries are marked by saving energy and protecting environment such as information technology, biotechnology, high-tech equipment manufacturer, new energy, new material, new-energy automobile industry. These industries belong to knowledge-intensive, low energy dependency and with a higher potential

profit space to work on. Through developing a new industrial sector in the secondary industry, internal structure of secondary industry can be optimized, it will be the real help to realize the goal of low-carbon economy in the future.

### **3.3 Commit to improving low carbon technologies**

General speaking, low carbon technology is all the technologies that can reduce carbon emission of human activities. Therefore we can say it is too broad to be defined exactly. The most authority definition that we can trace is 17 kinds of key technologies friendly to environment which is identified by international energy agency. All these technologies can be divided into two fields, that is non-carbon technology and decrease-carbon technology, carbon capture and shortage (CCS). Low carbon technology is indispensable part for reducing carbon emission by heavy industries, especially in developing countries such as China. And it can be predicted that low carbon technology will become a key point for a country's core competitiveness in the future. For current China's low carbon technology, some are just starting, some has formed industrial scale and take the leading in the world.

### **3.4 Building industrial ecosystem and clean production of "cell engineering"**

Through the simulation of natural ecosystems and the establishment of organic circular industrial development model, industrial ecology aims to solve the problems in industrial economic development, environmental protection, and sustainable uses of resources. We can make full use of resources, reduce wastes, use recycled materials, eliminate environmental damages, and improve the scale and quality of economic development, achieve sustainable economic development.

The enterprise is the micro but main one who carries the implementation of industrial ecology and the cycle-based enterprises are the ecosystem cells. To transfer a traditional system into an ecosystem, we must start from every enterprise's own ecology. We can start from those core enterprises, actively promote clean production of cell engineering, and push the qualified enterprises to establish ISO14001 environmental management system.

### **3.5 Develop circular economy by "artery-vein-industry" model**

Artery industry refers to the industries formed from raw material mining, production, distribution, consumption and waste. Vein industry refers to the industries which transform waste into renewable resources. These two types of industries are closely integrated to form a complete circular economy. They gather in a certain area and form an eco-industry cluster mode, i.e. artery and vein industry circular mode. The wastes generated from its consumed products are recycled,

and enter the vein industry, which will be transformed to renewable resources after dismantling and processing, and finally come back to artery industry and make some products for the market.

The construction of eco-industrial cluster involves not only the functional orientation of the region, the industrial type selection and eco-environment construction, but also the fundamental changes in policies and regulations, belief and values, scientific and technological levels, quality of the population and lifestyle, consumption patterns and humanistic environment, etc.

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