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DEVELOPMENT TREND OF CIRCULAR ECONOMY IN ASIA

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CONTENT

INTRODUCTION

Relevance of the theme. Circular economy is a new economic development model of green science. In particular, the symbiotic development of natural resources system and science and technology system has experienced the whole process of raw material consumption, finished products and waste disposal in the production process of enterprises, forming a primitive economic development model and entering an economic model that only relies on resource consumption to promote growth and relies on ecological resource circulation and sustainable development.

The term circular economy was first put forward by American economist K Paulding in 1960s. This concept is put forward based on the severe situation of global population explosion, resource shortage, environmental pollution and ecological transformation, which urges human beings to re-understand nature, respect objective laws and explore economic laws. It mainly follows the principle of "reduction, reuse and recycling", and minimizes waste discharge and protects the ecological environment by improving the utilization efficiency of resources and energy. [1]

Under the background of globalization, Asian countries are facing severe challenges of resource shortage, environmental pollution and ecological degradation. In order to meet these challenges, Asian countries began to actively explore the development model of circular economy in order to maximize the utilization of resources and sustainable development of the environment. Asian governments have introduced a series of policies and measures to promote the development of circular economy. Different countries and regions have chosen their own development paths of circular economy according to their own resource endowments, industrial characteristics and environmental conditions. Asian countries have also strengthened cooperation and exchanges in the field of circular economy.

Of course, the development of circular economy in Asia has broad prospects and great potential. In the future, with the continuous innovation of technology and the continuous improvement of policies, Asia's circular economy will usher in a broader development space and a better development prospect.

Literature review. This paper refers to the theoretical research results of some well-known scholars at home and abroad. These Chinese and foreign scientists include Gao Hong Shen, Zhang Jifeng, Fu Guoxin, Shen Yajie, Guo Zhen, Hu Jianglin, Hans Peter Martin, K Paulding, Richard Higgott, Liao Hong, Feng Zhijun and Zhou Hongchun. However, in the research literature of these scholars, there are more theoretical studies and relatively few studies combined with the actual situation in their own countries. Therefore, based on the above research results, this paper explains the theory of circular economy in detail, which provides strong strategic support for the practice of developing circular economy in Asia.

The purpose of the study. The purpose of studying circular economy in Asia is to achieve environmental sustainability, green economic transformation, effective use of resources and the achievement of global climate change goals, and to promote international cooperation and technological innovation.

The goal of the study.

- Improve the utilization rate of resources. Follow the principle of "reduction, reuse and recycling" to achieve scientific, green and efficient economic growth.

-Building a resource recycling industrial system, fully implementing recycling production methods, and enhancing the industrial output value of resource recycling.

-Promote green design and cleaner production, so as to reduce the steps of product processing and manufacturing and prolong the life cycle of materials and products.

-Strengthen international cooperation. Asia is developing more cooperation with European and American countries in the field of circular economy to meet the global climate challenge.

-Reducing environmental pollution and improving economic benefits by improving resource utilization efficiency and recycling.

The research object of this paper. It is representative of several major countries in Asia.

The theme of this study. Study the circular economy, environmental protection, economic development and renewable resources trading system in Asia to promote the sustainable development of Asian countries.

Personal contribution of the applicant. This paper is a work independently completed by the author, and the research results introduced in this paper are put forward and defended by the author.

Research methods. According to the research purpose of this paper, this paper mainly adopts theoretical analysis, empirical analysis, case study, comparative analysis, historical analysis and other research and analysis methods, and evaluates the effect of existing policies by analyzing the policy demand of developing circular economy in China and major Asian countries, and puts forward policy suggestions. Reveal the emission reduction mechanism and action path of circular economy, and explore and evaluate the contribution and potential of circular economy measures to greenhouse gas emission reduction. By comparing the practices and policies of different Asian countries in the field of circular economy, we can extract the international experience that is enlightening to China, which will help China learn from and

absorb international successful cases when formulating circular economy policies.

Scope and structure of the paper. The paper consists of three parts, and the conclusions and suggestions are listed in the 60-page text, including 10 tables, 3 pictures and 50 references.

CHAPTER 1 CIRCULAR ECONOMY OVERVIEW

1.1A summary of domestic and foreign literature on circular economy

Circular economy is a rational result of people's reflection on traditional production and consumption behavior under the situation of rapid population growth, rapid resource consumption and serious deterioration of ecological environment around the world. In 1960s, American economist Paulding put forward the term "circular economy". Since then, scholars at home and abroad have made further research and practice on circular economy. This chapter expounds the concept, connotation, essence, background, operation principle and basic characteristics of circular economy, which lays the foundation for the following elaboration and analysis.[1]

In recent years, scholars at home and abroad have made many related research achievements around the background, experience and achievements of developing circular economy in Asia and the reference to China. Li Ganshun of Hebei University in China pointed out that in the face of constant changes at home and abroad and pressure from all sides, in order to find the best solution, Asia chose the development model of circular economy and circular society. Cao Jie of Hebei University of Technology believes that in order to solve the contradiction between population, resources and environment and maintain sustainable development, building a recycling society has become a national policy in Asia. The experience of Asian laws and regulations on "circular economy" has important reference significance for China to develop circular economy and take the road of sustainable development. Experts in shandong institute of business and technology believe that the purpose of building a recycling society in Asia is to solve the increasingly serious garbage problem and change the traditional social and economic development model of "mass production, mass consumption and mass abandonment". Fan Lianying of Dongbei University of Finance and Economics believes that the garbage disposal problem caused by the traditional socio-economic model of

"mass production, mass consumption and mass abandonment" is one of the main domestic environmental problems facing Asia at present, and recycling garbage and taking the road of circular economy has become an inevitable choice for Asia. The recycling economy in Asia has made some progress in waste recycling and achieved a certain market scale, but the phenomenon of illegal dumping of waste still exists, which has delayed the development of recycling economy in Asia. Sun Guiyan of Chongqing Academy of Social Sciences believes that circular economy is the most directional and advanced economic development model in the development of modern world economy. Asia is one of the first countries in the world to explore the development model of circular economy, and it is also the country with the most perfect legislation and the highest recycling rate of resources, and the development of circular economy has achieved remarkable results. China is a developing country. In the process of economic development, the problems of resource shortage and environmental pollution are becoming more and more serious. At present, China has realized the importance of developing circular economy, and started to legislate on circular economy.[2]The policies and experiences of developing circular economy in Asia are worth learning and learning from China.

Based on the purpose of learning from the experience and lessons of developing circular economy in Asia, the Asian Research Center of Fudan University set up a research group on circular economy in Asia in September 2004, and published the book Circular Economy in Asia written by scholars Wei Quanping and Tong Shiping in January 2006. The book holds that the economic growth rate of Asia after the war is higher than that of other developed countries, and the special conditions of Asian economic development are more serious than those of developed countries in Europe and America, which also forces Asia to make great efforts to solve these problems earlier and embark on the road of developing circular economy earlier. There are many similarities between the rapid economic growth in Asia after the war

and the present situation in China. China should also attach importance to environmental issues and sustainable economic development as soon as possible, and many lessons accumulated in Asia can be used for reference.

In the book "Economic Theory of Resource Recycling Society", Asian scholar Yoshino Junzhi expounded the basic theory of constructing circular economy system in combination with the background and practice of developing circular economy in Asia. The book consists of three parts: practice analysis, cause analysis and policy design. The first part discusses the relationship between garbage disposal and renewable resources market and its practice in Asia. The second part analyzes the economic mechanism that supports today's one-way economy and expounds the economic factors that hinder the recycling of resources. The third part discusses the policy focus of promoting recycling and the policy means and system design on this basis. This book is the monograph of Asian scholars who systematically discussed the theory and practice of circular economy earlier. In recent years, the compulsory final disposal site and the environmental impact accompanying waste treatment have become the main problems. At the same time, the depletion of mineral resources in the future worries the world. How to overcome this environmental and resource constraint can be said to be the biggest issue facing the sustainable development of Asia in the 21st century.

Fumihiro Yoshida, an Asian scholar, pointed out in his book "Circular Society-Economics of Sustainable Future" that in recent years, with the goal of building a circular society, Asia has vigorously carried out waste reduction and recycling, which has not only failed to achieve obvious results, but also increased the troubles and expenses of local governments, enterprises and citizens, leading to illegal dumping and export of hazardous wastes overseas.

From the above literature review at home and abroad, we can see that there are many practical problems, but there are relatively few explanations for the combination of theory and practice; There are relatively many works that

briefly introduce the development of circular economy in Asia, but there are relatively few articles that combine Asia with China, especially how to learn from Asian experience to develop circular economy with China characteristics. In view of this, on the basis of comprehensively combing relevant theories, this paper mainly analyzes the position, function and practice of Asian governments, major industries, non-governmental organizations, enterprises and citizens in developing circular economy, expounds their management system, operation system, institutional environment, development model and economic effect, summarizes their successful experiences, and puts forward policy suggestions for developing circular economy in China.[3]

1.2 The connotation, essence and background of circular economy

At present, there are many definitions of circular economy by domestic experts and scholars. Among them, the more influential view holds that circular economy is a circular feedback process that organizes economic development activities into "natural resources-finished products-renewable resources", in which all raw materials and energy used can be used in the most scientific and reasonable way.

Most Asian scholars refer to circular economy as "circular society". The so-called circular society refers to a society that minimizes the consumption of natural resources and environmental load by restraining the generation of waste and utilizing circular resources in the whole process of social and economic activities such as resource exploitation, production, circulation, consumption and abandonment. However, Asian scholars often use the concepts of "circular economy", "circular economy body", "circular economy system" and "circular economy society", and they do not strictly distinguish these concepts. For example, Maruyama, a professor at the University of Tokyo in Asia, believes that in the past, the industrial society characterized by large-scale production, large-scale consumption and large-scale waste

separated mechanical production from organic production and pursued economy in the direction of relying on "scarce" resources to achieve maximum results.[4]Neoclassical economics, which has been developing rapidly and constantly improving in the United States, is used to explain the basic principles of this industrial society and plays an important role in determining the direction of savings. On the contrary, a society whose basic principle is to limit the economic scale to the sustainable range of the ecosystem combines mechanical production with organic production, converges the resource consumption to the environmental capacity, and implements the principle of saving on this basis. This kind of society is called circular society, and the economics that expounds its basic principles is called circular economics. In order to transform industrial society into circular society, it is necessary to establish circular economics. Nowadays, not only in Asia, but also all countries in the world regard the construction of circular economy and circular society as their main development goals. The goal of circular economy and society can be summarized in three aspects: people's life and production activities must be carried out on the basis of taking into account people's life and health, the integrity of ecosystem and maintaining and preserving the production base of future generations; Human activities are the main cause of waste, and many environmental-related problems of waste are also the result of human social and economic activities. These problems are closely related to the problems of resources and energy as the entrance and utilization object of social and economic activities. Therefore, when facing and solving environmental problems, we should not only do it on the extension line of previous public hazards, but also consider energy and resources comprehensively. In addition, not only the activities of individuals and organizations should be transformed into environment-friendly, but also it is difficult to establish a circular economy society without the reform, perfection, technological innovation and

information sharing among relevant subjects.[5]Based on the above considerations, in 2000, six related laws were formulated or revised in Asia, with the Basic Law for Promoting the Formation of a Circular Society as the core, which defined the direction of restraining the consumption of natural resources as much as possible and reducing the environmental load by ensuring the suppression of waste generation, recycling and correct disposal of circular resources.

The above different expressions stem from different views on circular economy. Generally speaking, it can be defined from the perspectives of resource utilization, environmental protection and ecological economy. This phenomenon occurs because the contents of these definitions are derived from the concepts of resource economics, environmental economics and ecological economics respectively. Because of the different backgrounds of developing circular economy in different countries, the understanding of the connotation of circular economy is also varied.

Scholars who understand from the ecological sense believe that the so-called circular economy is an economy that uses ecological laws to guide human economic behavior and integrates green production and waste utilization. It can also be said that circular economy is to realize the harmonious symbiosis between natural resources and human activities and make economic activities green and ecological according to the law of ecological development. This is an inevitable choice and an important guarantee for implementing the strategy of sustainable development.[6] A scientific circular economy system usually includes the following parts: resource exploitation, processing and manufacturing, consumption and waste disposal. By establishing the thinking of circular economy, we can provide opinions and suggestions for optimizing the relationship between the components of the system, provide theoretical basis for the transformation from traditional economy to circular economy, and

strive to solve the growing contradiction between natural resources, living environment and economic development.

From the direction of material flow, the economic model of traditional industrial society is one-way linear economy, that is, "resources-products-waste". Circular economy is a revolution to linear economy. The growth of traditional linear economy depends on high-intensity resource exploitation and consumption and high-intensity ecological environment destruction. Linear economy is the superposition of some unrelated linear material flows, which forms the economic characteristics of "high exploitation, low utilization and high emission" and is the fundamental reason for the deterioration of contemporary resource and environmental problems. Circular economy requires interconnection within the system to maximize the use of resources, hoping to achieve the effect of "low exploitation, high utilization and low emission". The cooperation and contact within the circular economy system, all the resources and elements involved should be reasonably and fully utilized in a sustainable cycle, so as to minimize the impact of human economic activities on the natural environment. In 2001, Asia put forward the development goal of "one country in the world", the basic motivation of which was to completely abandon the previous economic and social development model of "mass production, mass consumption and mass abandonment" and seek to establish a "simple, high-quality circular society with sustainable development as the basic concept"; Completely change the linear economic model characterized by "mass production, mass consumption and mass waste" and replace it with the circular economic development model of "optimal production, optimal consumption and minimum waste".[7]

The main feature of circular economy is the closed-loop use of resources, which is characterized by low emission of pollutants or even zero emission on the premise of protecting the environment. Its development model integrates

clean production, comprehensive utilization of resources and sustainable consumption. It uses the law of ecological development to guide the economic activities of human society. It can be seen that circular economy is actually a new type of ecological economy in essence. Its important task is to protect natural resources and improve the utilization efficiency of various resources, which is also our mission. The development process of circular economy is a production process of comprehensive utilization of resources and their wastes, even the "residue" of "dead" products. The implementation of this production process can achieve the purpose of protecting and saving resources to the maximum extent. The development model of circular economy opposes the one-time consumption of resources, advocates the reuse or reuse of resources for many times, and advocates the recycling of products that have reached the service life, so as to turn waste into renewable resources and renewable products, that is, the purpose of "turning waste into treasure". [8]

The connotation of circular economy is summarized in the following table (Table 1-1).

Table 1-1 Summary of the Connotation of Circular Economy

Serial number	Project	Main contents	Remarks
1	The connotation of circular economy	Recycling of resources, eco-friendliness, economic model innovation and social value	
2	The essence of circular economy	Reduction, reuse, recycling and system optimization	
3	background of circular economy	Scarcity of resources and environmental pressure, demand for sustainable development, support of policies and regulations, and drive of technological innovation	
4	The characteristics of circular economy	Closed-loop, systematic, innovative, comprehensive, dynamic and participatory	

Source: Prepared by the author

1.3 Operating principles and basic characteristics of circular economy

Circular economy is a challenge to the thinking and ideas of modern economics, which further reveals the basic laws of market economy. In the

thinking and concept of modern economics, the fundamental task of man is to develop productive forces, that is, to improve his ability to conquer and transform nature and to oppose man and nature. Circular economy is to treat nature well, create nature, unify man and nature, and realize a win-win situation between man and nature. The market law of modern economics is the law of value and the law of supply and demand, taking into account the factors such as price, market, profit, supply and demand, etc., which is manifested in the irreversible consumption and plunder of resources by rational "economic man", resulting in "destruction-repair-destruction" of resources and "pollution-governance-pollution" of the environment.

The basic principles of circular economy are: reduction, reuse and recycling, which is the so-called "3R" principle. Circular economy requires that resources and environment should be studied as endogenous variables affecting economic growth, and ecological laws should be put in the first place. According to the self-purification ability of the environment and the regenerative ability of resources, the resources and environment are used according to the principle of "reduction, reuse and recycling".[9]

The principle of reduction, also known as the principle of material reduction, refers to continuously improving the efficiency of resource production and energy utilization, minimizing the exploitation and utilization of non-renewable resources, and actively advocating the development and utilization of renewable resources. Reduction is the first principle that circular economy must abide by, which is mainly aimed at the initial end, aiming at reducing the flow of resources entering the production and consumption process, so as to reduce the generation of waste as much as possible. Although terminal treatment has played a certain role in pollution control, it also has many disadvantages, such as the compensation standard and compensation group are difficult to determine, while circular economy is a nip in the bud,

taking waste prevention as the fundamental goal, and requires minimizing the generation of waste in both production and consumption. In the field of production, new technology can reduce the use of resources, produce miniaturized and lightweight products, save resources and reduce pollution emissions during the use of these products, avoid luxury packaging when packaging products, and only use necessary packaging.[10] In the field of consumption, consumers should cultivate the awareness of choosing products with simple packaging, durability and reusability. In the production field, the use of new technology can reduce the use of resources, try to produce small and lightweight products, and at the same time save resources, reduce pollution emissions and avoid luxury packaging in the process of using products. In the field of consumption, it is necessary to cultivate consumers' awareness of saving. Producers save resources by reducing the input of raw materials and optimizing the production process. The principle of reduction requires that resources be effectively saved in the whole production process, and the established production or consumption purposes can be achieved with less raw materials and energy input, so that resources can be saved from the source, pollution can be reduced, and finally the goal of "reduction" can be achieved.

The principle of reuse requires that all kinds of resources should be used as many times or in various ways as possible in production and consumption activities, so as to avoid articles becoming garbage prematurely. First, the use time of products and services should be extended during design and production; Second, continue to use waste, such as the reuse of used household appliances, and basically do not change the physical form and structure of used items. The principle of reuse requires that the manufactured products and packaging containers can be reused in the original form; In order to resist the proliferation of disposable products in today's world, producers should design products and their packaging as daily necessities, so that they can be reused

like tableware and backpacks. Therefore, "reuse" has both the significance of process control and terminal management.[11]

The recycling principle is also called "recycling" or "recycling" principle. It requires that the produced goods can become available resources again after completing their use functions, rather than unrecyclable garbage. Through physical and chemical processes, waste is transformed into new economic resources, and waste is recycled and put into production and consumption processes, which belongs to terminal control. It turns waste into resources and reduces the final treatment capacity.

Each of the above three principles is crucial to the successful implementation of circular economy: the principle of reduction is aimed at the input end and aims to reduce the flow of materials and energy into the production and consumption process. In other words, the generation of waste is avoided by prevention rather than terminal treatment; Reuse principle is a process method aimed at increasing the time intensity of products and services. In other words, use items as many times or in many ways as possible to avoid becoming garbage prematurely; The principle of recycling mainly refers to a way of output, which can turn waste into resources again to reduce the final treatment capacity, which is what we usually call the recycling and comprehensive utilization of waste.[12]Recycling can reduce the generation of garbage and make new products that consume less energy.

At the same time, circular economy has the following basic characteristics. Efficient use of resources, through clean production and green technology, improve resource utilization efficiency and reduce waste; Environmental friendliness, reducing pollutant emissions, protecting the ecological environment, and realizing harmonious symbiosis between economy and environment; The combination of economic benefits and social benefits pays attention to social equity and people's all-round development

while pursuing economic benefits; Policy-oriented, relying on the support and guidance of government policies and regulations, forming a policy environment conducive to the development of circular economy; Market-driven, through the market mechanism, encourage enterprises to adopt circular economy mode and improve market competitiveness; Technical support, relying on technological innovation to promote the implementation and development of circular economy; Diversity of participants, including government, enterprises, social organizations and consumers; Regional synergy, the development of circular economy needs the cooperation between different regions to form a regional circular economy network; Internationalization and circular economy is a global trend, which requires international cooperation and exchanges.[13]

Based on the above basic principles and characteristics, this requires us to build a circular society and provide the necessary social environment conditions and support system for the development of circular economy. That is to say, only by building a circular society can we meet the people's growing material and cultural needs through rational production, efficient utilization, advocating economy and eliminating waste in all aspects of production, circulation and consumption, and change the unsustainable production and consumption pattern with as little resource consumption as possible; Only in this way can we change the ethics, values and behaviors that are not friendly to the environment, establish the values and consumption concepts of resource conservation, and establish and cultivate the production methods, living habits and consumption behaviors of resource conservation.

It can be seen that the circular society is an environment-friendly society, a society in which all sectors of society participate extensively, and a society that aims at sustainable development and realizes all-round economic, social and environmental development. Building a circular society requires not only

the active efforts of the government, enterprises, scientific and technological personnel and the public from all walks of life, but also the improvement and establishment of many soft environmental conditions such as laws and regulations, policy system, economic and technological system, moral culture, etc. Starting with the adjustment of macroeconomic structure, with the transformation of economic development model as the core, the concept and principles of circular economy are effectively incorporated into the overall planning of economic and social development and various major decisions such as legislation.[14]

In order to understand the principles and characteristics of circular economy, China is taken as an example and illustrated with data (see Table 1-2).

Table 1-2 Principles and characteristics of circular economy (taking China as an example)

Project	Specific content	Give an example	Data source
Principles of circular economy	Reduction principle	From 2013 to 2023, the industrial water consumption in China decreased by about 20%, which was achieved through water-saving measures and recycling technology	China Ministry of Water Resources China Water Resources Bulletin
	Reuse principle	In 2019, the recycling rate of scrap steel in China reached over 90%, and the utilization rate in plastic recycling reached 30%	Annual Report on Recycling of Renewable Resources by China Renewable Resources Recycling Association
	Recycle principle	In 2020, the harmless treatment rate of municipal solid waste in China will reach over 99%, of which the recycling rate will be about 20%	Bulletin of the Ministry of Environment of China on the Environmental Situation in China.
Characteris-tics of circular economy	Efficient utilization of resources	In 2022, the number of new energy buses in China will reach 500,000, accounting for 60% of the total number of buses	China Public Transport Association Annual Report of China Public Transport Industry
	Environmental friendliness	In 2022, China's carbon emission intensity dropped to 0.48 kg/10,000 yuan GDP, which was about 35% lower than that in 2010	China Energy Statistics Yearbook by National Bureau of Statistics

	Policy orientation	By 2023, China has issued more than 50 policies related to circular economy, including tax incentives and financial support	China government network policy document library
	Market driving force	In 2022, the issuance scale of green bonds in China reached about 80 billion yuan, a year-on-year increase of 50%	China bond market development report
	Technical support	By 2023, China has more than 15,000 high-tech enterprises, many of which focus on technologies related to circular economy	China High-tech Industry Annual Report by the Ministry of Science and Technology of China;
	Regional synergy	By 2023, China has established more than 100 regional circular economy alliances to promote inter-regional resource sharing and cooperation	Report on Coordinated Development of Regional Circular Economy
	Internationalism	In 2022, China launched international cooperation projects on circular economy with more than 100 countries and regions around the world	China Ministry of Foreign Affairs Annual Report on China's Foreign Economic Cooperation

Source: Prepared by the author

Conclusion to Chapter 1

This chapter comprehensively and deeply discusses the concept, connotation, essence, background, operation principle, basic characteristics and development mode of circular economy, and emphasizes its importance in promoting sustainable development. Circular economy, as a revolutionary change to the traditional linear economic model, aims to achieve efficient use of resources and effective protection of the environment through the principles of reduction, reuse and recycling. China's exploration and practice of circular economy shows its importance as a national strategy. Through policy guidance, legal formulation and pilot projects, China has made positive progress in promoting the development of circular economy. Although it still faces many challenges, circular economy has become an important way for China to realize a resource-saving and environment-friendly society. The experience of Asia and other countries in the field of circular economy provides valuable reference for China, especially in legal system construction, technological innovation, industrial structure adjustment and social awareness

promotion. China needs to combine its own national conditions and develop a circular economy model suitable for China. The implementation of circular economy needs the joint efforts of the government, enterprises and the public to build an environment-friendly and resource-saving circular society through institutional innovation, technological progress and cultural change.[15]This is not only a challenge to the traditional economic development model, but also a necessary choice to realize the harmonious coexistence between man and nature and the balance between economy and ecology.

CHAPTER 2 ASIAN BUSINESS AND THE CIRCULAR ECONOMY

In Asia, since the initiative of building a circular economy system was put forward in 1990, the then Ministry of International Trade and Industry promulgated the Principles of Industrial Waste Treatment (1991), the Asian Parliament passed and promulgated the Law on Promoting the Utilization of Renewable Resources (1991) and the Basic Law on the Environment (1993), and the Economic and Social Council formulated the environmental initiative of "Building a Circular Society" (1996 Driven by such laws and policies, Asian business circles have also taken various measures to actively participate in the trend of developing circular economy and building a circular society with practical actions: first, Asian enterprises actively build circular economy systems and production systems; Secondly, carry out circular economy activities centered on large enterprises; Thirdly, incorporate environmental issues into the business strategy of enterprises, actively implement "independent environmental management", and strive to make environmental protection activities consistent with the economic interests of enterprises; Finally, actively respond to the environmental control and market access standards of all countries in the world.[16]

Asian enterprises are actively committed to the development of circular economy and the construction of circular society from the following aspects: fully consider environmental factors in product design and production, extensively carry out "ecological design" and adopt recyclable materials, pay attention to reducing and controlling the generation of waste from the source, and provide high-quality products with low environmental load for the society; Enterprises use their own talents and technological advantages to participate in the development of circular economy and the construction of circular society independently, consciously and spontaneously, and make full and reasonable use of the wastes generated in the production process and from society as much

as possible, so as to make them be recycled reasonably. In a word, Asian enterprises are committed to developing circular economy, building a circular society and conscientiously implementing the "3R principle".[17]

The strategic policy of building a circular society put forward by Asian governments has won the hearts of the people, and enterprises have also responded positively, actively cooperating with relevant parties to do a good job in circular economy. Asian enterprises have adopted a variety of practices in developing circular economy, aiming at achieving efficient use of resources, reducing environmental pollution and promoting the sustainable development of enterprises. The following is a list of specific practices adopted by some major Asian countries in developing circular economy, as shown in Table 2-1.

Table 2-1 Main Practices of Developing Circular Economy in Asian Countries

Serial number	Country	Policies and regulations	Resource recovery and reuse	Life cycle management	Environmental protection technology innovation	Industry consolidation and coordination	Substitution of environmental protection materials	Consumer participation and marketing	International cooperation and exchange
1	China	√	√	√	√	√	√	√	√
2	Japan	√	√	√	√	√	√	√	√
3	Korea	√	√	√	√	√	√	√	√
4	India	√	√	√	√	√	√	√	√
5	Indonesia	√	√	√	√	√	√	√	√
6	Viet Nam	√	√	√	√	√	√	√	√

Source: Prepared by the author

(Note: This is a statistical table on the main practices of developing circular economy in major Asian countries, and the " √ " in the table indicates that this country has adopted corresponding practices in this field)

In the following, the work of promoting the development of circular economy in major Asian countries is expounded respectively.

Japan. Japanese enterprises actively take measures to develop circular economy, encourage enterprises to achieve sustainable development, and

promote the environmental protection process of the whole society. Among all developed countries, the country with the most comprehensive circular economy legislation is Japan. At present, Japan has promulgated seven laws, including the Basic Law for Promoting the Establishment of a Circular Society and the Law for Promoting the Effective Use of Resources. These laws provide a legal basis for the development of circular economy, clarify the responsibilities of enterprises, and require enterprises to take necessary measures to recycle resources voluntarily. The Japanese government helps enterprises to establish a circular economy production system by providing subsidies, low-interest loans, tax exemption and other means. The state has also set up special service companies to provide services for enterprises that are unable to establish a complete packaging recycling system and help enterprises fulfill the "producer responsibility system". Japanese enterprises pay attention to improving the efficiency of resource utilization, and reduce resource consumption and waste discharge in the production process by adopting new technologies and new processes. In product design, they pay attention to the recyclability and reusability of products and reduce the waste after the end of product life cycle. They have established a perfect waste recycling system to classify, recycle and reuse the waste produced in the production process. Japanese enterprises actively promote cleaner production, and reduce pollutant emissions in the production process by improving production processes and optimizing production processes. At the same time, the enterprise has also strengthened the environmental protection training for employees to improve their environmental awareness and skill level. Japanese enterprises pay attention to collaboration and cooperation with other enterprises or industries, and realize the sharing and recycling of resources by establishing industrial symbiosis. For example, in the industrial park, different enterprises can use wastes as raw materials or energy to form a closed-loop industrial chain. Japanese enterprises pay attention to technological innovation

and research and development, and develop new circular economy technologies and products by investing a lot of money and resources. [18] These new technologies and products not only help enterprises to realize efficient utilization of resources and recycling of wastes, but also promote the progress of environmental protection technology in the whole society. Japanese enterprises actively participate in social welfare activities and support the development of circular economy and environmental protection by donating funds and providing technical support. At the same time, enterprises also pay attention to public education, and popularize the knowledge and concept of circular economy to the public through lectures, exhibitions and other activities. Promote the development and popularization of circular economy by improving public awareness and participation in environmental protection. These practices of Japanese government and enterprises reflect the innovation and efforts of Japanese enterprises in the development of circular economy, aiming at realizing the sustainable utilization of resources and environmental protection, as shown in Table 2-2.

Table 2-2 Main Measures for Japanese Enterprises to Develop Circular Economy

Serial num-ber	Main measures	Specific content	Remarks
1	Resource recovery and reuse	Waste sorting and recycling, plastic recycling, scrap metal and electronic products recycling	
2	Product life cycle management	Cyclicity, leasing and sharing services are considered in the design stage	
3	Environmental protection technology innovation	Cleaner production technology, green chemistry	
4	Industry consolidation and coordination	Industrial symbiosis, supply chain management	
5	Substitution of environmental protection materials	Biodegradable materials, recycled materials	
6	Compliance with policies and regulations	Environmental management system, comply with environmental protection laws and regulations, such as the Law on the Promotion of Recycling and the Law on the Promotion of Recycling of Plastic Resources	
7	Consumer education and cooperation	Consumer education, recycling cooperation plan;	

8	International cooperation and exchange	Technology transfer, joint research and development	

Source: Prepared by the author

China. In China, enterprises actively learn from international advanced experience in developing circular economy, and take a series of effective measures in combination with their own actual situation. The government has promulgated and improved policies and regulations to promote the development of circular economy. The most important law is the Circular Economy Promotion Law of the People's Republic of China, which encourages enterprises to participate in circular economy through preferential tax policies on comprehensive utilization of resources, environmental protection, energy saving and water saving, and measures such as income tax reduction and VAT refund upon collection. Formulate industrial standards for circular economy and promote the standardization and development of circular economy industry. Set up special funds for circular economy and funds in the central budget, and increase support for key projects of circular economy. Encourage financial institutions to provide green credit, green securities, green bonds and other investment and financing support for circular economy projects. Enterprises have also increased their R&D investment in the field of circular economy, and promoted the R&D and application of new technologies, new processes and new equipment. Introduce, digest and absorb foreign advanced technology, and carry out secondary innovation in combination with domestic reality. At the same time, accelerate the application of information technology, biotechnology and new materials in resource conservation and circular economy development. Popularize new technologies such as intelligent sorting and closed-loop supply chain management system to improve the efficiency and accuracy of resource recycling. Build a circular economy industrial chain, optimize the industrial structure, promote the transformation and upgrading of traditional industries, develop emerging industries such as high efficiency,

energy saving and resource recycling, strengthen the construction of circular economy parks and demonstration areas, and form an industrial agglomeration effect. Promote close cooperation and collaboration between upstream and downstream enterprises in the industrial chain, optimize resource allocation and improve production efficiency. Establish a circular economy information sharing platform to promote information sharing and cooperation among enterprises. Strengthen resource conservation and environmental protection, improve resource utilization efficiency, reduce resource waste, and promote the use of energy-saving and water-saving products and energy-saving and environment-friendly equipment.[19]Reduce pollutant emissions, improve environmental quality, implement cleaner production, and reduce environmental risks in the production process. The whole society has also strengthened publicity and education to raise the public's awareness and participation in circular economy. Promote the concept and practice of circular economy through various channels such as media, network and social activities. Encourage consumers to choose recyclable products and establish a reward system for consumers in circular economy. Promote enterprises to adopt renewable materials and improve the recyclability and reuse rate of products. At the same time, actively participate in international circular economy cooperation projects and learn from international advanced experience and technology. Strengthen exchanges and cooperation with international organizations and countries to promote the global development of circular economy. Actively participate in the formulation and revision of international circular economy standards, and promote the integration of China circular economy standards with international standards. The implementation of these measures will help enterprises in China to improve the efficiency of resource utilization, reduce environmental pollution and promote the coordinated development of economy and environment (see Table 2-3 for details). In addition, Table 2-4 compares the main indicators of circular economy

development in China (2013-2023), which reflects the progress and achievements of China in the field of circular economy, and also provides a reliable basis for future policy formulation and industry development.

Table 2-3 Main Measures for China Enterprises to Develop Circular Economy

Serial num-ber	Main measures	Specific content	Remarks
1	Follow and formulate policies and regulations	Comply with national laws and regulations, mainly the Circular Economy Promotion Law of the People's Republic of China, supported by local policies	
2	Resource recovery and reuse	Waste recovery system, remanufacturing and reuse	
3	Product life cycle management	Ecological design, product recycling plan	
4	Environmental protection technology innovation	Clean production technology, green process research and development	
5	Industry consolidation and coordination	Industrial symbiosis, supply chain management	
6	Substitution of environmental protection materials	Material innovation, replacing traditional materials	
7	Consumer education and marketing	Consumer education, promotion of environmental protection products	
8	Internal management of enterprises	Environmental management system, internal audit	
9	International cooperation and exchange	Technology introduction and international exchange	
10	Capital investment and incentive mechanism	Capital investment and incentive mechanism	

Source: Prepared by the author

Table 2-4 Comparison of Main Indicators of Developing Circular Economy in China (2013-2023)

Serial num-ber	Indicators	Year		Source of data	remarks
		2013	2023		
1	Waste paper recovery rate	45%	55%	Annual report issued by China Paper Association	
2	Recovery rate of waste plastics	25%	40%	Development Report of Waste Plastics Recycling Industry by China Plastics Processing Industry Association	
3	Recycling rate of scrap metal	60%	75%	Circular Economy Development Report of China Nonferrous Metals Industry Association	
4	Application rate of cleaner production technology	30%	65%	Cleaner Production Assessment Report published by the Ministry of Ecology and Environment	

5	Market share of environmental protection products	5%	15%	Annual Report on Green Manufacturing of Ministry of Industry and Information Technology	
6	Number of ISO 14001 certified enterprises	12 thousand	25 thousand	Certification statistics report issued by China Certification and Accreditation Association	

Source: Prepared by the author

Korea. In South Korea, the government has formulated a series of laws and regulations, which provide legal protection for the development of circular economy. For example, the promulgation of the Law on the Recycling of Resources has clarified the responsibilities and obligations of enterprises in the recycling of resources and promoted the popularization and development of circular economy. At the same time, the government also encourages enterprises to adopt circular economy model through policy guidance, and provides incentives such as tax incentives and financial subsidies. Korean enterprises pay attention to improving resource utilization efficiency and reduce resource waste by optimizing production processes and adopting new technologies. For example, in the manufacturing industry, enterprises adopt advanced production technology and equipment to improve the utilization rate of raw materials and the qualified rate of products. Korean enterprises have established a perfect waste recycling system to classify, recycle and reuse the wastes produced in the production process.[20]By recycling waste, enterprises not only reduce the cost of waste treatment, but also obtain new sources of resources. Korean enterprises pay attention to green supply chain management, and implement environmental protection management in the whole process from raw material procurement, production and sales to waste disposal. By selecting environmental protection suppliers and promoting green packaging, the environmental impact in the product life cycle can be reduced. Korean enterprises pay attention to technological innovation and research and development, and develop new circular economy technologies and products by investing a lot of money and resources. For example, the Korea Institute of

Science and Technology (KIST) has successfully developed a fiber-based adsorbent, which can efficiently recover gold from electronic waste with a recovery rate of over 99.9%. The innovation of this technology not only improves the efficiency of resource recovery, but also reduces the recovery cost, which provides a new impetus for the development of circular economy. Korean enterprises pay attention to the collaboration and cooperation with other enterprises or industries, and realize the sharing and recycling of resources by establishing industrial symbiosis. The South Korean government encourages the development of green industrial clusters and promotes the agglomeration and upgrading of green industries through policy support and financial support. Korean enterprises actively participate in social welfare activities and support the development of circular economy and environmental protection by donating funds and providing technical support. At the same time, enterprises also strengthen communication and cooperation with the government, communities and the public to jointly promote the development of circular economy. Korean enterprises pay attention to public education, and popularize the knowledge and concept of circular economy to the public by holding lectures, exhibitions and other activities. Promote the development and popularization of circular economy by improving public awareness and participation in environmental protection.[21]In Table 2-5, some main indicators are adopted, reflecting the main achievements of South Korea in developing circular economy in the past decade.

Table 2-5 Comparison of Main Indicators for Developing Circular Economy in Korea (2013-2023)

Serial num-ber	Indicators	Year		Source of data	remarks
		2013	2023		
1	Waste paper recovery rate	70%	80%	White Paper on Circular Economy issued by the Ministry of Environment of Korea	
2	Recovery rate of waste plastics	30%	50%	White Paper on Circular Economy issued by the Ministry of Environment of Korea	
3	Recycling rate of scrap metal	50%	70%	Yearbook of Environmental Statistics of Korea Statistics Bureau	

4	Application rate of cleaner production technology	30%	60%	Cleaner Production Annual Report of the Ministry of Environment of Korea	
5	Market share of environmental protection products	10%	25%	White Paper on Environmental Protection Industry of Korea Ministry of Industry, Trade and Resources	
6	Number of ISO 14001 certified enterprises	10 thousand	15 thousand	Statistics on Certification of Environmental Management System, Ministry of Environment of Korea	

Source: Prepared by the author

India. Indian enterprises are also actively exploring and practicing in developing circular economy. The Indian government has provided a series of fiscal policies to support the development of circular economy, such as setting up a special revolving fund to provide low-interest or interest-free loans to support the development of renewable energy such as wind power, providing low-interest loans for the development of renewable energy technologies, and providing 10%-15% equipment investment subsidies to reduce the operating costs of renewable energy enterprises. In addition, the Indian government has introduced a series of preferential tax policies, such as exemption from value-added tax, tariff preference or exemption from tariff, accelerated depreciation (such as 100% accelerated depreciation policy for wind power equipment) and income tax credit, to encourage enterprises to participate in circular economy. Indian enterprises pay attention to the recycling and reuse of waste, and turn waste into valuable resources through advanced technology and technology. For example, some enterprises use recycled plastic, paper, metal and other wastes to produce new products and realize the recycling of resources. Indian enterprises actively promote green production, adopt environmentally-friendly production processes and equipment, and reduce energy consumption and waste emissions in the production process.[22]At the same time, enterprises also strengthen green supply chain management, choose environmentally friendly suppliers and partners, and jointly promote the development of circular economy. Indian enterprises have made remarkable achievements in technological innovation and research and development in the field of circular

economy. For example, some enterprises have developed advanced waste classification and treatment technology, which has improved the recycling rate of waste; Some enterprises have developed new environmental protection materials, which have replaced traditional non-environmental protection materials and reduced the environmental impact of their products. Indian enterprises pay attention to the collaboration and cooperation with other enterprises or industries, and realize the sharing and recycling of resources by establishing industrial symbiosis. The Indian government encourages the development of green industrial clusters and promotes the agglomeration and upgrading of green industries through policy support and financial support. At the same time, enterprises also strengthen communication and cooperation with the government, communities and the public to jointly promote the development of circular economy.[23]Indian enterprises popularize the knowledge and ideas of circular economy to the public by holding lectures, exhibitions and other activities, and promote the development and popularization of circular economy. The following table (Table 2-6) is the main index of developing circular economy in India in recent ten years.

Table 2-6 Comparison of Main Indicators of Developing Circular Economy in India (2013-2023)

Serial num-ber	Indicators	Year		Source of data	remarks
		2013	2023		
1	Waste paper recovery rate	23%	30%	Annual Report on Solid Waste Management by the Ministry of Environment, Forests and Climate Change of India;	
2	Recovery rate of waste plastics	15%	25%	Report on the Management of Plastic Waste by the Ministry of Environment, Forestry and Climate Change of India	
3	Recycling rate of scrap metal	45%	60%	Analysis Report on Scrap Metal Recycling and Utilization Industry of Indian Ministry of Commerce	
4	Application rate of cleaner production technology	30%	60%	Promotion Report of Cleaner Production by the Ministry of Environment, Forests and Climate Change of India	
5	Number of policies and regulations related to circular economy	10items	25items	List of Policies and Regulations Issued by the Ministry of Environment, Forests and Climate Change of India	

6	Total investment related to circular economy	$1 billion	$3 billion	Investment Promotion Report of Indian Ministry of Industrial Policy and Promotion	

Source: Prepared by the author

Iran. Iran has taken a series of measures in developing circular economy, aiming at improving resource utilization efficiency, reducing environmental pollution and promoting sustainable economic development. For example, through legislation to ensure the recycling of resources, formulate relevant regulations and standards, and clarify the responsibilities and obligations of enterprises in resource recycling. At the same time, the government also provides incentives such as tax incentives and financial subsidies to encourage enterprises to adopt circular economy mode and improve resource utilization efficiency. Iran pays attention to the recycling and reuse of waste, and transforms waste into valuable resources through advanced technology and technology. A perfect system has been established in waste classification, collection, transportation and treatment to ensure the effective recovery and reuse of waste. In addition, Iran also encourages enterprises to adopt green production methods to reduce energy consumption and waste emissions in the production process. By providing technical support and financial support, the government helps enterprises to improve production technology and equipment and improve resource utilization efficiency. At the same time, Iran also actively promotes green consumption, encourages consumers to buy environmentally friendly products and use renewable energy, and reduces dependence on traditional energy sources. Iran actively participates in international cooperation and exchanges in the field of circular economy, learning from the advanced experience and technology of other countries. In the field of circular economy, Iran pays attention to the development of emerging industries such as renewable energy and environmental protection industries, and at the same time strengthens the transformation and upgrading of traditional industries to improve resource utilization efficiency and environmental protection level. Iran has also implemented a series of specific

projects and plans to promote the development of circular economy. For example, the government has formulated a plan of "curbing inflation and developing production" to promote the transformation of production and other fields, increase the supply of goods and improve the level of employment. In addition, Iran has strengthened cooperation with international organizations to jointly promote the implementation of circular economy projects.[24]The following table (Table 2-7) is the main evaluation index of Iran's development of circular economy in recent ten years.

Table 2-7 Comparison of Main Indicators of Developing Circular Economy in Iran (2013-2023)

Serial num-ber	Indicators	Year		Source of data	remarks
		2013	2023		
1	Waste paper recovery rate	20%	30%	Reports issued by Iranian environmental protection organizations or Iranian statistical centers	
2	Recovery rate of waste plastics	15%	25%	Reports issued by Iranian environmental protection organizations or Iranian statistical centers	
3	Recycling rate of scrap metal	30%	40%	Reports issued by the Iranian Ministry of Industry or the Iranian Statistical Center	
4	Application rate of cleaner production technology	10%	20%	Reports issued by Iranian environmental protection organizations or the Iranian Ministry of Industry	
5	Number of policies and regulations related to circular economy	5 items	15 items	Policies and regulations issued by the Iranian Ministry of Environment and Natural Resources or the Iranian Parliament	
6	Total investment related to circular economy	$500 million	$1.5 billion	Investment reports issued by the Iranian Ministry of Industry or the Iranian Investment Promotion Center	

Source: Prepared by the author

2.2 The effectiveness of circular economy development in Asia

Asia has made remarkable achievements in developing circular economy, which are reflected in many aspects, including the reduction of environmental load, the improvement of resource utilization efficiency, the promotion of green production and the strengthening of regional cooperation. Asian countries have effectively reduced the environmental load by developing

circular economy. For example, green production and green consumption advocated by Japan's circular economy have reduced the environmental load. Japanese companies, such as Toyota, have effectively reduced the environmental pressure by improving fuel efficiency, reducing exhaust emissions, reducing automobile noise and reducing the use of substances harmful to the environment. In addition, Japan has also improved the recycling rate of resources and reduced the discharge of waste through a perfect garbage sorting and recycling system.[25]

By developing circular economy, Asian countries have significantly improved the efficiency of resource utilization. This is mainly reflected in the following aspects: First, the recycling and reuse of waste. Asian countries have established a perfect waste recycling system, and transformed waste into valuable resources through advanced technology and technology. The second is the recycling of resources. Asian countries encourage enterprises to adopt circular economy mode in the production process, realize the recycling of resources and reduce the waste of resources. The third is the promotion of green production methods. Asian countries actively promote green production methods, encourage enterprises to adopt energy-saving and environmentally-friendly production technologies and equipment, and improve resource utilization efficiency. Asian countries actively promote green production in the process of developing circular economy. This includes not only adopting environmental protection technology and equipment in the production process, but also promoting green products and green consumption. For example, China's "new three products" such as new energy vehicles, lithium batteries and photovoltaic products have all achieved double-digit growth, which reflects the positive achievements of China in green production. In addition, Asian countries have also formulated relevant laws and standards to guide enterprises to adopt green production methods and promoted the development of green industries. In the process of developing circular economy, Asian

countries have strengthened regional cooperation. This is mainly reflected in the following aspects: First, policy coordination. Asian countries jointly promote the development of circular economy through policy coordination. For example, the Asian Development Bank has guided Asian countries to strengthen cooperation in the field of circular economy by issuing relevant reports and policy recommendations.[26]The second is technical exchange and cooperation. Asian countries jointly promote the innovation and application of circular economy technology through technical exchanges and cooperation. For example, Japan has made remarkable achievements in technological innovation and application in the field of circular economy, and other countries can learn from its advanced technology through cooperation with Japan. The third is the opening and integration of regional markets. Asian countries have promoted the trade and exchange of circular economy products by strengthening the opening and integration of regional markets. This will help to expand the market scale of circular economy products and improve the competitiveness and influence of products. In the process of developing circular economy, Asian countries have also achieved remarkable economic benefits. By improving resource utilization efficiency, reducing production costs and promoting green products, enterprises in Asian countries have gained greater competitive advantages in the market. At the same time, the development of circular economy has also promoted the development of related industries and increased employment, which has injected new impetus into the economic development of Asian countries.

The following is a summary of the achievements made by several representative countries in Asia in developing circular economy. China government has formulated a series of policies and regulations, such as the Circular Economy Promotion Law, which provides legal protection for the development of circular economy.[27]China has established a perfect waste recycling system, including waste sorting and waste recycling. At the same

time, China also actively promotes the recycling of waste materials, such as the recycling and reuse of waste metals and the dismantling and recycling of waste electronic products. China actively promotes green production methods and encourages enterprises to adopt energy-saving and environment-friendly production technologies and equipment. In addition, China also advocates green consumption and encourages consumers to buy environmentally friendly products and use renewable energy. China has made remarkable achievements in technological innovation in the field of circular economy, such as the rapid development of "new three" products such as new energy vehicles, lithium batteries and photovoltaic products. China actively participates in international cooperation and exchanges in the field of circular economy, learns from the advanced experience and technology of other countries, and promotes international cooperation and development of circular economy. The Japanese government has also formulated perfect laws, regulations and policy systems on circular economy, such as the Basic Law on the Formation and Promotion of Circular Society, which provides legal protection for the development of circular economy. Japan has established an efficient waste recovery and reuse system, and achieved closed-loop management of waste classification, collection, transportation and treatment. Japanese enterprises actively adopt green production methods to reduce energy consumption and waste emissions. At the same time, Japanese consumers also have a high awareness of environmental protection and actively buy and use environmentally friendly products. Japan is in a leading position in technological innovation in the field of circular economy, such as hydrogen fuel cell technology and waste recycling technology.[28]Japan actively participates in international cooperation and exchanges in the field of circular economy, and promotes international cooperation and development of circular economy through technology transfer and financial support. The Indian government also promotes the development of circular economy by formulating policies and

regulations. For example, by formulating waste management regulations and promoting renewable energy, we can promote resource conservation and recycling. By implementing measures such as garbage sorting and promoting the recycling of waste materials, the recycling rate of resources has been improved. Indian consumers have gradually realized the importance of environmental protection and started to buy and use environmentally friendly products. Although India started late in technological innovation in the field of circular economy, it is also actively developing related technologies. For example, in the field of renewable energy, India has made some achievements. India also actively participates in international cooperation and exchanges in the field of circular economy, and promotes the development of its own circular economy by introducing advanced technology and management experience. The Korean government has formulated a number of policies and regulations, for example, by formulating waste management laws, promoting circular economy and other measures to improve the level of resource conservation and recycling. South Korea has made remarkable achievements in waste recovery and reuse. For example, the recycling rate of resources has been effectively improved by implementing the garbage classification system and promoting the recycling of waste materials. Korean enterprises actively adopt green production methods to reduce energy consumption and waste emissions. At the same time, Korean consumers also have a high awareness of environmental protection and actively buy and use environmentally friendly products. South Korea is in a leading position in technological innovation in the field of circular economy. For example, remarkable achievements have been made in the fields of waste resource utilization and clean energy. South Korea actively participates in international cooperation and exchanges in the field of circular economy, and promotes international cooperation and development of circular economy through technology transfer and financial support.[29]

To sum up, major Asian countries have made remarkable achievements in developing circular economy. These achievements are not only reflected in the formulation of policies and regulations, resource recovery and reuse, green production and consumption, but also in technological innovation and application and international cooperation and exchanges. In the future, these countries will continue to strengthen the development of circular economy and contribute to the realization of sustainable development goals. Table 2-8 lists the achievements of circular economy in some major Asian countries.

Table 2-8 Effect of Circular Economy in Major Asian Countries

Country	Effectiveness	Data sources
China	By 2023, the scale of resource recycling industry will exceed 4 trillion yuan; The total recovery of renewable resources reached 590 million tons; The comprehensive utilization rate of crop straw reaches above 86%; The comprehensive utilization rate of bulk solid waste reached 56%	chinese government network
Japan	The resource output rate increased to 490,000 yuan/ton; The recycling rate of resources increased to 18%; The recycling rate of waste increased to 47%; The final disposal of waste was reduced to 13 million tons.	prcee.org
Koren	It is estimated that by 2027, the final disposal rate of waste will be reduced to 3.0%, the actual recovery rate will be increased to 82.0%, the energy recovery rate of waste will be increased from 12.66%, the resource circulation rate will be increased to 14.0-16.4%, and the resource productivity will be increased to 1900 USD/ton.	Energy & Environment

Source: Prepared by the author

2.3 Development Trends of Circular Economy in Asia

As an important engine of global economic growth, Asia is facing the dual challenges of resource and environmental constraints and climate change. In this context, as a new economic development model, circular economy has been highly valued by Asian countries. Circular economy takes the efficient utilization and recycling of resources as the core, and takes the principle of "reduction, reuse and recycling" as the aim to realize the sustainable development of economy, society and environment. Its development trend is mainly as follows: First, policies and regulations will be gradually improved. In order to promote the development of circular economy, Asian countries will speed up the revision and formulation of relevant laws and policies, guide and standardize corporate behavior, and promote the development of circular

economy. The second is the coordinated development of the upstream and downstream of the industrial chain. In the future, circular economy is not just a matter for a single enterprise or region, but for the whole industrial chain. Therefore, enterprises in all aspects need to coordinate development and jointly promote circular economy. Third, technological innovation is accelerating. With the continuous development of technology, the application of various new technologies will better support and promote the development of circular economy. For example, the application of new technologies such as artificial intelligence, Internet of Things and blockchain will bring new opportunities for the development of circular economy. Fourth, corporate social responsibility will become more and more important. More and more enterprises are beginning to realize their social responsibilities, one of which is to reduce resource consumption and waste generation in the production process and actively participate in the construction of circular economy. These enterprises play an important role in promoting the development of circular economy and will gain more social recognition.[30]Fifth, international cooperation will be further developed. The construction of circular economy needs the joint efforts of all parties, so international cooperation will also become an important direction for future development. At the international level, Asian countries can strengthen cooperation, learn from each other's experience and jointly promote the development of circular economy. At the same time, countries can also promote the standardization, standardization and internationalization of circular economy construction by participating in the cooperation of multilateral institutions.

In the future, major Asian countries will attach great importance to the development of circular economy. Specifically, the China government has already incorporated the development of circular economy into its national strategy, and clearly put forward its development goals in the "14th Five-Year Plan". The China Municipal Government issued the "14th Five-Year Plan for

Circular Economy Development", proposing that by 2025, the circular production mode will be fully implemented, the comprehensive utilization capacity of resources will be significantly improved, and the resource circular industrial system will be basically established. In addition, China is also promoting the construction of green supply chain, encouraging enterprises to realize green environmental protection in the whole product cycle. The Japanese government will also further promote the construction of a circular society and encourage enterprises to adopt a circular economy model to reduce waste generation. Japan has implemented the Law on Promoting the Formation of Circular Society to promote the reuse of resources and reduce the generation of waste. Japan also pays attention to technological innovation and promotes the development of circular economy. The Korean government continues to promote the green growth strategy, encourage the development of circular economy and improve the efficiency of resource utilization. South Korea has revised the enforcement decrees and rules of the circular economy law to further promote the country's transformation into a circular economy society. The Indian government insists on promoting the "Clean India" campaign at the national level, encouraging garbage sorting and recycling. India has implemented the Rules for the Management of Electronic Waste and the Rules for the Management of Plastic Waste to promote the standardized recycling and disposal of waste. Other Southeast Asian countries, such as Thailand, the Philippines and Malaysia, are facing the problem of plastic pollution and are transforming into circular economy.[31]These countries have formulated a road map for circular economy, giving priority to policies related to plastic products and investing in target industries and regions.

In a word, the development of circular economy in Asia is in a stage of rapid development, and the efforts and progress of Asian countries in the field of circular economy are aimed at promoting the green transformation and sustainable development of the economy.[32]Through policy promotion,

technological innovation, market potential mining, international cooperation and social participation, Asian circular economy is expected to play a greater role in carbon emission reduction and efficient use of resources, and contribute to global sustainable development.

Chapter II Conclusion

This chapter discusses in detail the development status, main practices and achievements of Asian enterprises in the field of circular economy, and looks forward to the future development trend. In Asia, the construction of circular economy has been strongly supported by governments of various countries, and enterprises have also responded positively. They have actively participated in the trend of developing circular economy and building a circular society by building a circular economy system, carrying out circular economy activities centered on large enterprises, incorporating environmental issues into business strategies, and promoting independent environmental management. Asian enterprises have taken a series of measures in product design, production, resource utilization and environmental protection, such as ecological design, using recyclable materials, improving resource utilization efficiency, establishing waste recycling system, promoting cleaner production, strengthening environmental protection training, promoting industrial symbiosis, paying attention to technological innovation and research and development, and participating in social welfare activities. Asian countries such as China, Japan, South Korea and India have made remarkable achievements in developing circular economy, which are reflected in the reduction of environmental load, the improvement of resource utilization efficiency, the promotion of green production and the strengthening of regional cooperation. These countries have effectively promoted the development of circular economy by formulating policies and regulations, establishing waste recycling systems, promoting green production and consumption, and strengthening technological innovation.

In the future, the development trend of circular economy in Asia will be manifested in the gradual improvement of policies and regulations, the coordinated development of upstream and downstream of industrial chain, the acceleration of technological innovation, the enhancement of corporate social responsibility and the further development of international cooperation. Governments will continue to promote the legislative and policy support of circular economy, enterprises will pay more attention to the practice of circular economy, technological innovation will provide more possibilities for circular economy, and international cooperation will help to share experience and resources and jointly promote the development of circular economy. Generally speaking, Asian enterprises have played an important role in the construction of circular economy, and the efforts of governments and enterprises in various countries have achieved remarkable results, and the future development prospects are broad, which is expected to make greater contributions to global sustainable development.

CHAPTER 3 BUILDING A RENEWABLE RESOURCES TRADING SYSTEM

3.1 The necessity and existing problems of building a renewable resource trading system.

In Asia, with the rapid economic development of various countries, their demand for resources is also increasing. Increasingly scarce resources and deteriorating environment will also limit future economic development. Countries in Asia are actively thinking about whether they can find a way of sustainable development that can save resources, improve resource utilization and reduce environmental pollution. Judging from the measures generally adopted by various countries at present, it is the best development model to strive to implement circular economy and build a circular society. Circular economy emphasizes the recycling of various resources, which can not only reduce resource consumption, improve resource utilization efficiency, but also effectively reduce the discharge of substances to the environment.[33] The rapid development of Asian economy in recent decades can not be separated from the sustained growth of trade volume among countries. The development of trade has promoted the economic growth of all countries, and economic growth has stimulated domestic demand, which in turn has promoted the development of trade. This is a virtuous circle. At the same time, trade has also promoted the development of economic globalization. Many developed countries have transferred their traditional manufacturing industries to newly industrialized countries in Asia, and in turn, these newly industrialized countries have exported a large number of products to developed countries.

Therefore, on the one hand, the amount of garbage produced by developed countries exceeds its recycling capacity; Moreover, due to the high labor cost and poor economic benefit of repeated recycling, it is difficult to deal with these wastes (including recyclable resources). On the other hand, these newly industrialized countries have a huge demand for resources due to the

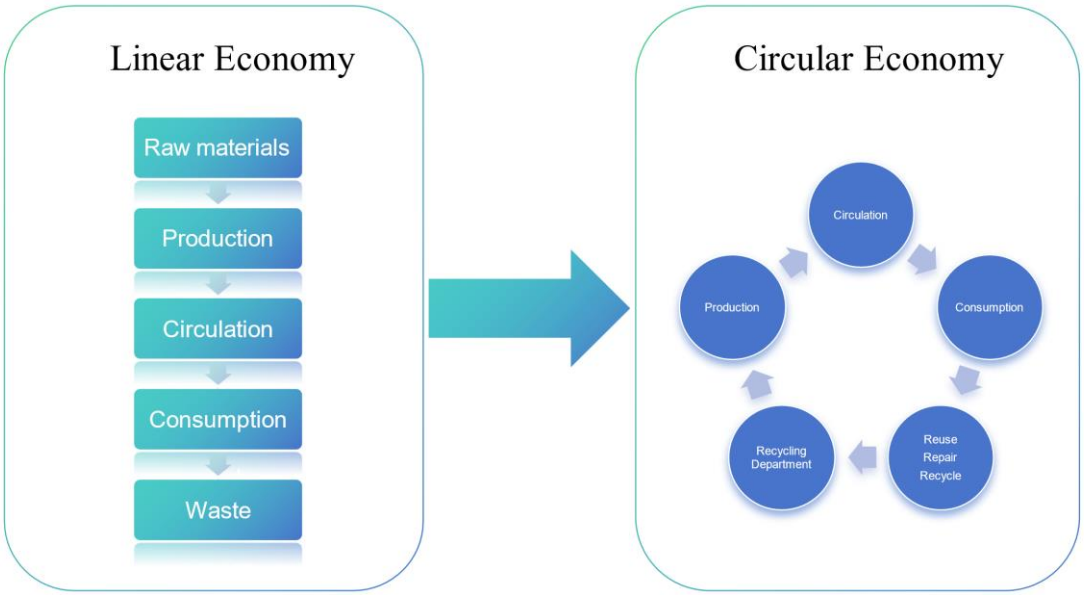
continuous expansion of production scale. The shortage of natural resources and rising prices have prompted them to turn to the development and utilization of recyclable resources, and because of the low price of labor, their demand for recyclable resources is increasing. It is precisely because of the above two factors that a large number of recyclable resources are exported from developed countries to newly industrialized countries. Newly industrialized countries export industrial products to developed countries, and after consumption and use, developed countries export recyclable resources to newly industrialized countries. This mode of material flow forms an international circular economy, and trade acts as the medium of material circulation. However, in this process, due to various factors, environmental damage and environmental pollution, this international material circulation is not smooth. First of all, a large number of unrecoverable waste trade has caused great harm to importing countries, such as electronic waste, various domestic waste, toxic and harmful industrial waste and so on; Secondly, recycling recyclable resources may also cause environmental damage and pollution; In addition, reuse those used second-hand products, because their high energy consumption may have a negative impact on the environment; Finally, countries with poor environmental conditions may reject products made of renewable resources because they think their processing and production processes are not environmentally friendly.[34]

In order to effectively control and restrain the transboundary movement of hazardous wastes between countries, the Basel Convention came into being, and then the treaty was extended to the transboundary management of other renewable resources, and all its contracting parties were provided with relevant responsibilities and obligations. However, these restrictive policies are not always effective, and the illegal smuggling of garbage (including non-recyclable garbage and hazardous waste) without official channels has not been reduced so far. Moreover, its complex constraints and implementation

procedures have caused a lot of economic and time costs and hindered the development of international circular economy. Another consequence of strict trade restrictions is the increase of smuggling interests, which will make smuggling more rampant. However, if the problem of transboundary movement of hazardous wastes and non-recyclable wastes cannot be effectively solved, more control will be imposed on recyclable resources.[35] The end result of this is that a large number of recyclable resources are wasted in exporting countries, while countries that need such resources are in a state of suspension due to lack of resources (of course, some countries may have the conditions to develop more natural resources). And this consequence has brought about the inefficiency of global resource utilization and the increase of environmental burden.

Figure 3-1 Contrast between linear economy and circular economy

Source: Prepared by the author



So how can we manage the cross-border transfer of recyclable resources more effectively, and how can we build a reasonable and effective Asian (worldwide) circular economy society? In order to find a way to establish an international resource recycling economy, it is necessary to analyze and study

the problems that are prone to cross-border transfer and the views of countries (regions, governments, organizations and individuals) that oppose the trade in renewable resources. [36] Only in this way can the formulated policies be more targeted and realistic.

The main problems are as follows: First, garbage is labeled as recyclable resources and imported (exported) to some countries. As mentioned in Chapter 2, in international trade, non-recyclable waste and hazardous waste will be wrongly labeled as safe recyclable waste. For example, in 2004, some criminals disguised industrial waste as waste paper and entered China port through Qingdao. Second, although some materials can be recycled, other wastes will still be generated during the processing. Because some recyclable resources may produce new wastes and residues in the process of utilization, they will be abandoned. According to this logic, we can also say that since the use of those natural resources will produce waste and harmful substances, then we should not use natural resources.[37] However, this problem has led some countries (governments) to take cautious restrictions on renewable resources. Third, recycling enterprises will also produce pollution. Recycling enterprises do produce pollution. If we need to process the garbage resources imported from abroad in addition to domestic garbage resources, it will expand the pollution to the environment. Fourth, the increase of imported renewable resources will hinder the utilization level of domestic renewable resources. Many developing countries began to import recyclable resources before developing domestic circular economy. In this case, importing a large number of recyclable resources may affect the recycling of domestic garbage and aggravate the problem of garbage disposal. Fifth, although the Basel Convention provides ready-made management methods for developing countries, bureaucratic corruption in some countries will hinder the correct implementation of this management system. This kind of view comes from non-governmental organizations all over the world (including developing

countries), who are skeptical and worried about the management ability of developing countries.[38]

In view of the above problems, the following countermeasures and suggestions are put forward: First, regarding the problem that garbage is wrongly marked as recyclable resources, it is necessary to strengthen supervision and testing in international trade to ensure that all wastes marked as recyclable are indeed recyclable, which can be achieved by improving testing technology and strengthening customs inspection. Strengthen international cooperation, share information, and crack down on illegal waste transfer, especially the illegal export of developing countries. The second is about the problem that new wastes and residues are generated in the processing of recyclable resources.[39] By improving the recovery and reuse technology, the wastes and residues generated in the processing can be reduced. Strengthen the supervision of recycling enterprises to ensure that they adopt the best feasible technology and reduce the generation of waste. Third, regarding the pollution caused by recycling enterprises, it is necessary to strengthen the implementation of environmental laws and regulations, ensure that recycling enterprises take necessary pollution prevention measures, conduct environmental impact assessment and supervision on a regular basis, popularize cleaner production technologies, and reduce pollution emissions during recycling. Fourth, the increase of imported renewable resources hinders the utilization level of domestic renewable resources. We should vigorously develop domestic circular economy, improve the efficiency of recycling and utilization of domestic renewable resources, encourage the development of domestic recycling industry through policy incentives and technical support, limit the import of low-quality or highly polluting renewable resources, and protect the domestic environment and recycling market. Fifth, regarding the problem that the implementation of the Basel Convention is hindered by bureaucratic corruption, we can strengthen government supervision, reduce the

impact of bureaucratic corruption on the implementation of the Basel Convention, establish a stricter supervision mechanism and increase public participation, enhance the supervision role of non-governmental organizations and civil society, and improve the evaluation and supervision of the management capacity of developing countries.[40]

3.2 Constructing a reasonable trading system of renewable resources

The most important issue of transboundary management of recyclable resources is the formulation of strict laws and regulations to control the transboundary movement of hazardous wastes, which makes the normal trade of recyclable resources very difficult. At the same time, because the regulations on the import and export of these wastes have not been fully and effectively implemented, the problems of non-recyclable garbage trade and transboundary movement of hazardous wastes are still rampant. In view of these situations, the following measures are put forward.[41]

First of all, we should strengthen the management of transboundary movement of hazardous wastes. First, clearly distinguish the difference between recyclable resources, hazardous waste and waste materials. Because these related concepts cannot be clearly distinguished, there are many unnecessary troubles and problems in the transaction of recyclable resources. For example, many unrecoverable wastes are exported as waste paper or waste plastics, while unusable electronic wastes are traded as second-hand products, and some recyclable resources are prohibited from crossing the border because they are wrongly identified as hazardous wastes.[42] Even if sometimes the customs has detected some suspicious transport goods, it is difficult to prevent these goods from entering or leaving the country because there is no clear standard to distinguish whether they are hazardous waste or not. Therefore, it is necessary for the Basel Convention organization and the contracting parties to jointly establish a clearer and more feasible resource classification standard to ensure the more effective operation of the trade in recyclable resources. For

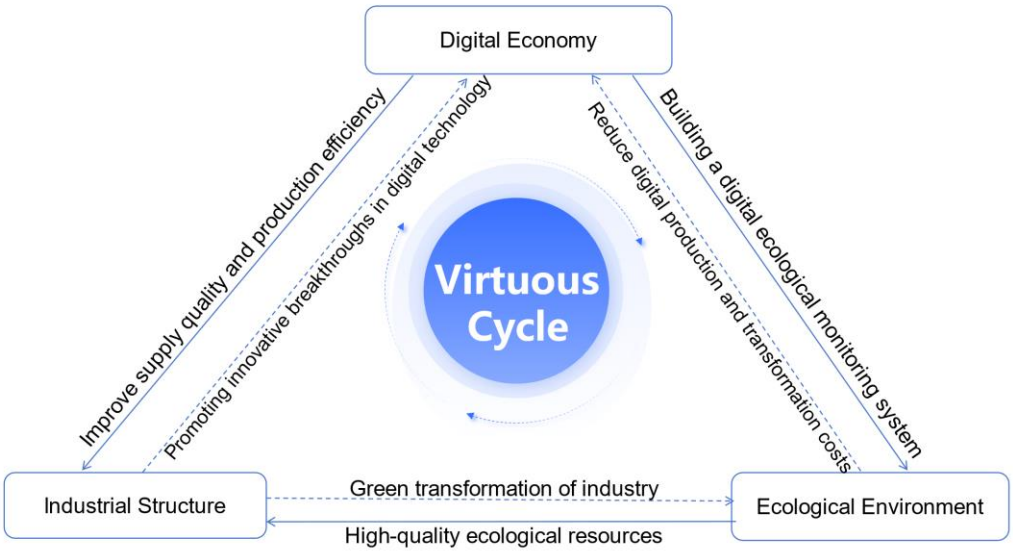
example, the Basel Convention should restrict the unwashed waste PET plastic bottles, because they are easy to cause health and safety problems, and there will be more residues in the treatment process, but the cleaned and pressed waste PET bottles should be allowed to trade.[43] Because the Basel Convention has not made this provision and explanation at present, different countries have adopted different policies. For example, China banned the import of waste PET plastic bottles without cleaning treatment, the Philippines allowed such wastes to enter the country, and Asia banned the illegal transportation of waste PET bottles in January 2005. Hong Kong and Australia took the lead in establishing a system standard to distinguish second-hand electrical appliances from electronic waste. Hong Kong requires exporters to import these second-hand electrical appliances (such as televisions and computer monitors) into Hong Kong only after inspection and confirmation, and requires reasonable packaging to ensure that they will not be damaged during transportation. In October 2004, the Australian government also issued many standards, such as whether the equipment can start running, to distinguish second-hand products from electronic waste. The second is to strengthen information exchange between relevant executive departments of various countries. In order to effectively manage the transboundary movement of hazardous wastes, it is necessary to strengthen exchanges and cooperation between import and export departments of various countries. The importer shall inform the exporting country of its import standards and give necessary and reasonable explanations. This can not only reduce the risk of export goods being returned because they do not meet the import standards, but also make it easy to distinguish whether the importing country or the export violates the Basel Convention even if there is a problem. It is also necessary to confirm the rationality and operability of the repatriation procedure.[44] In some cases, although the exporter did not export the goods as required by the importer, it was not repatriated to the exporting country, because the real source of the

goods is another third country, so it is necessary to strengthen the information exchange with the third country. At this time, the third country should conduct export inspection according to the import standards of the final importing country. Countries also need to cooperate in training inspectors from customs and other relevant departments, or jointly compile inspection manuals. We should also strengthen academic research cooperation in the field of renewable resources trade in order to better promote the level of trade development. The third is to establish the traceability of international recyclable trade. Many countries manage the transfer and transportation of hazardous wastes in their own countries by establishing registration systems.[45] Under this system, all kinds of information about hazardous waste are recorded, such as related producers, transporters, recyclers and final disposers. Practice has proved that this retrospective management method is very effective. If this system is extended to the international trade of recyclable resources, it is believed that some liability disputes can be better solved. Taiwan Province Province has established an online registration system, requiring foreign enterprises to inform whether the recyclable resources imported from Taiwan Province Province have been recycled through the network, and requiring local enterprises to submit two reports: the report that recyclable resources have been received and the report that the recycling process has been completed. In Asia, some companies are trying to set up a recycling enterprise, which can monitor whether recyclable resources are transported abroad from manufacturers according to regulations through the global positioning system (GPRS). It is believed that with the establishment of these different forms of international registration systems, the trade of recyclable resources will develop in a healthier direction. The fourth is to increase penalties. It can improve the customs inspection of the exporting country, the customs inspection of the importing country and other relevant inspections of the importing country (including industry and commerce and enterprises) to find

and stop the illegal border crossing of threatened wastes. However, in fact, these illegal cross-border incidents can still escape punishment. For example, in Asia, there is no punishment for exporters who attempt to export useless and dangerous garbage, and even attempts to export illegally are found by customs, but as long as exporters withdraw their export applications, they will not be punished. In May 2005, the Asian government submitted a proposal to amend the Waste Management and Public Cleanliness Law, suggesting that exporters who tried to export waste without official permission should be punished as attempted criminals. Similarly, it is necessary to jointly crack down on illegal exporters through cooperation and information exchange between the government and relevant departments.[46]

Figure 3-2 Digital economy,Industrial structure and ecological environment

Source: Prepared by the author



Secondly, we should improve the reasonable and systematic trade procedures. At present, the development of international trade in renewable resources is restricted by various complicated procedures and regulations. Various application systems and examination and approval systems not only consume the economic costs of importers and exporters, but also waste a lot of

time. How to formulate simple and effective import and export procedures will be an important topic for future research. In some cases, the import and export procedures can be appropriately adjusted and deleted. For example, for those enterprises that have been engaged in the export of recyclable waste for a long time, their quality control ability, scale and reputation level are relatively high, so customs inspection before customs declaration can be omitted, and some examination and approval procedures can be simplified compared with those enterprises that import environmentally-friendly renewable resources. In addition, if the competent authorities cannot fully exchange and share information, it will extend the time to complete the prescribed procedures. Therefore, we can delete the same comments from different departments by strengthening information exchange.[47] For countries with high environmental quality requirements such as Asia, due to strict pollution control and detection, exporters who often engage in this kind of renewable resources trade can appropriately reduce the pre-export approval procedures. Many management departments don't know enough about the production technical conditions and pollution control level of recycling enterprises, and worry about polluting the environment, and set too many restrictions on the trade of some recyclable resources. At this time, it is necessary for enterprises and various competent departments to communicate with each other and negotiate with each other to jointly formulate some approval procedures and technical standards.

Specifically, the construction of a reasonable trading system of renewable resources can be started from the following aspects: First, clear classification standards. Establishing an internationally recognized and clear resource classification standard to distinguish recyclable resources, hazardous wastes and waste materials requires the joint efforts of international organizations such as the Basel Convention and the contracting parties. For some specific types of recyclable resources, such as waste PET plastic bottles, specific

trading rules should be formulated, such as restricting the trading of unwashed waste PET plastic bottles and allowing the trading of washed and pressed waste PET bottles. The second is to strengthen information exchange and cooperation. Strengthen exchanges and cooperation between import and export departments of various countries, share import standards and necessary reasonable explanations, so as to reduce the risk of goods being returned because they do not meet the standards. Establish and improve repatriation procedures to ensure that the real country of origin of the goods conducts export inspection according to the standards of the final importing country. Train inspectors from customs and other relevant departments, jointly compile inspection manuals, and strengthen academic research cooperation in the field of renewable resources trade. The third is to establish the traceability of international recyclable trade. Popularize the registration system and record all kinds of information of hazardous wastes, such as producers, transporters, recyclers and final disposers, so as to solve liability disputes. Establish a network registration system, require foreign enterprises to inform whether the imported recyclable resources have been recycled through the network, and require local enterprises to submit relevant reports. The fourth is to strengthen technical support and innovation. Use technical means, such as Global Positioning System (GPRS), to monitor the transportation process of recyclable resources and ensure that they are transported from manufacturers to foreign countries according to regulations. Fifth, public education and participation.[48] Raise public awareness of the value of renewable resources and encourage the public to participate in the recovery and utilization of renewable resources. Through these measures, we can build a more reasonable, efficient and environmentally friendly trading system of renewable resources and promote the sustainable utilization of global resources.

3.3 Countermeasures and suggestions on perfecting the transaction of renewable resources

Under the background of circular economy, it is the key to construct and improve the trading system of renewable resources to follow the "3R principle" (that is, Reduce, Reuse and Recycle). In order to make the circular economy in Asia and even the world develop better, all countries should do their best and cooperate together to reduce all kinds of environmental pollution problems it brings. The following are some measures and suggestions.

The first is to strengthen legal and policy support. Formulate and implement stricter laws and regulations to Reduce waste generation. This includes strengthening the extended producer responsibility system, requiring enterprises to be responsible for the whole life cycle of their products, and considering reducing resource consumption and waste generation from the design stage. Encourage enterprises and consumers to Reuse and Recycle resources through incentives such as tax incentives and subsidies.

Figure 3-3 Principles of circular economy

Source: Prepared by the author

The second is to strengthen the level of pollution control and promote technology development and transfer. Intuitively, adopting stricter environmental protection policies can reduce the environmental pollution of recycling enterprises. But in fact, in some countries and regions, the pollution problem caused by the utilization of waste resources can not be solved only by implementing strict environmental protection policies, because a large number

of practitioners are small enterprises and family workshops without certification qualifications. Therefore, the implementation of effective industry qualification certification policy is the primary measure. Secondly, those technologies with low recycling efficiency and heavy pollution need to be eliminated and updated quickly. This requires government departments to invest in developing new technologies on the one hand, and introduce advanced technologies from developed countries on the other.[49]

The third is to educate recycling users about the environment. Usually, the environmental pollution caused by small recycling plants is more serious. Take recycling lead as an example, lead plates can be disassembled from waste batteries (including automobile batteries), and then these lead plates can be melted and cast into lead ingots after simple cleaning, so that they can be recycled. If we don't consider the pollution to the environment and the damage to human health, this processing process is very simple. But in fact, the toxic electrolyte in the storage battery has seriously polluted the local water and soil zone. Supported by the US-Asia Environmental Partnership, an international non-governmental organization, the Joint Committee on Lead Phase-out participated in activities aimed at eliminating lead pollution in Indonesia. The organization plans to reduce the serious local pollution problem by providing environmental education to these family workshops engaged in lead recycling. Interestingly, this kind of environmental education is not carried out by environmental workers, but by local mosque monks and Christian priests. Because most local people are Muslims or Christians, they go to mosques or churches every week, so they take this opportunity to give them environmental education. In fact, the content of environmental education is mainly to collect and sort out the contents that are beneficial to environmental protection from the Koran and the Bible, supplemented by the knowledge of lead toxicity.

The fourth is to establish and expand financial support. Some banking groups provide low-interest loans to small and medium-sized enterprises in

some developing countries (such as China and Indonesia) for pollution control and cleaner production technologies. Through the investigation of some recycling enterprises, these loans are used for the technological transformation of cleaner production, which not only improves the recycling rate of resources, but also reduces environmental pollution. However, some enterprises did not exchange these low-interest loans for technology, but bought raw materials and equipment to expand production. At this time, pollution did not decrease, but increased. Therefore, it must be noted that such loans cannot be used for investments unrelated to environmental protection, but it is also difficult to require enterprises to purchase only environmental protection equipment, so it will be a better way to use these funds for the transformation and application of cleaner production technology.

The fifth is to standardize the waste recycling logistics system. Formulating and implementing the circulation restriction policy of recyclable resources can effectively prevent these resources from flowing into unqualified small enterprises and family workshops, thus reducing environmental pollution. In May, 2001, the Ministry of Environment and Forest of India promulgated and implemented the Regulations on Battery Management and Disposal, which was used to standardize the circulation channels of lead-acid batteries and prevent them from flowing into informal recycling enterprises. The regulations require that only recycling enterprises and government-authorized recycling enterprises can dispose of waste batteries. In addition, the regulations also manage and supervise enterprises that transport batteries.

Sixth, we should improve the import tariff and subsidy system. The import tariffs on renewable resources in Asia are generally low, and many developing countries have begun to import foreign recyclable resources before establishing a circular economy system in their own countries. In this case, it has certain influence and destruction on the establishment and development of domestic waste recycling (including recycling). Sixth, policies to improve

market competitiveness. If the ban on logging is lifted and the supply of wood can meet the demand of the paper industry, then the decrease of wood price will lead to the decrease of waste paper price.[50] If the price is low to a certain extent, the waste paper recycling industry will be at a standstill. Although recyclable resources cannot completely replace natural resources in quantity and quality, the recovery rate of recyclable resources will also change with the change of natural resource prices.

Chapter III Conclusion

This chapter deeply discusses the necessity, existing problems and countermeasures to improve the trading system of renewable resources. With the rapid development of Asian economy, the demand for resources is rising, and environmental problems are becoming increasingly prominent. Developing circular economy has become an important way to achieve sustainable development. Building a trading system of renewable resources is of great significance for promoting the recycling of resources, reducing resource consumption and reducing environmental pollution. However, there are many problems in the current trading system, such as garbage being mislabeled as recyclable resources, new wastes being generated in the recycling process, environmental pollution of recycling enterprises, influence of imported renewable resources on domestic recycling industry, bureaucratic corruption hindering the implementation of management system, etc. In order to solve these problems, this chapter puts forward a series of measures and suggestions. First of all, it is necessary to strengthen the management of transboundary movement of hazardous waste, clearly distinguish recyclable resources, hazardous waste and waste materials, strengthen the information exchange between the executive departments of various countries, establish the traceability of international recyclable trade, and increase penalties. Secondly, we should improve reasonable and systematic trade procedures, simplify examination and approval procedures, strengthen information

exchange and improve efficiency. In addition, this chapter also puts forward other countermeasures and suggestions, including strengthening pollution control, promoting technology development and transfer, educating recycling users on the environment, establishing and expanding financial support, standardizing waste recycling logistics system, improving import tariffs and subsidies, and improving market competitiveness. In a word, it is very important to build a reasonable and effective trading system of renewable resources to promote the development of circular economy in Asia and even the world. By taking the above measures and suggestions, we can effectively solve the existing problems, promote the rational utilization of renewable resources, reduce environmental pollution, improve the efficiency of resource utilization, and make contributions to the sustainable development of economy, society and environment.

CONCLUSIONS

In this paper, we deeply discuss the development status, challenges and future trends of circular economy in Asia, comprehensively analyze the theoretical basis, enterprise-level practice, policy environment and technological innovation of circular economy, and systematically study the necessity of building a trading system for renewable resources. The research content is highly consistent with the goal, covering many key aspects of circular economy, including the construction of theoretical framework, the practical cases of Asian enterprises, the summary of policies and regulations of various governments, and the discussion on the improvement strategy of trading system.

The main achievement of this paper is to systematically explain the concept of circular economy, deeply analyze the practice of Asian enterprises in the field of circular economy, comprehensively summarize the policies and regulations of Asian governments, and innovatively explore the construction of renewable resources trading system. The innovation of this paper lies in adopting multi-angle analysis method, combining with empirical research, putting forward specific policy suggestions, and designing an innovative trading system construction framework.

Although this paper has made some achievements, there are still some shortcomings. The limitation of data acquisition affects the in-depth quantitative analysis of the impact of circular economy, and the follow-up research can be further deepened on the existing basis. In addition, follow-up researchers can expand the scope of case studies and explore the practical experience of more countries, as well as the difficulties and challenges in the implementation of circular economy. Future research should also build a more perfect economic model to evaluate the economic benefits of circular economy more accurately.

Generally speaking, this paper not only provides a solid theoretical basis for understanding circular economy, but also provides strong strategic support for the practice of circular economy in Asia, and at the same time contributes valuable experience and insights to global sustainable development. Future research should focus on technological innovation, international cooperation, policy evaluation and changes in social behavior in order to promote the further development and perfection of circular economy.

REFERENCES

1.Bennett, Nathan J.etal. "Advancing social equity in and through marine conservation." Frontiers in Marine Science 8 (2021): 711538.

2.Zhou, Sophie, and Sjak Smulders. "Closing the loop in a circular economy: Saving resources or suffocating innovations?." European Economic Review 139 (2021): 103857.

3.Lv, Mengdi, et al. "The spatial changes of China's environmental efficiency and driving factors from the perspective of circular economy." Environmental Science and Pollution Research 30.9 (2023): 23312-23334.

4.Qi,J.L. "Agglomeration and radiation effect of the pull of urbanization." Chinese Geographical Science 13 (2003): 224-227.

5.Hosny, Amr Sadek. "Theories of economic integration: A survey of the economic and political literature." International Journal of economy, management and social sciences 2.5 (2013): 133-155.

6.Preston, T.R. "Strategy for sustainable use of natural renewable resources: Constraints and opportunities." First FAO Electronic Conference on Tropical Feeds and Feeding Systems. 1995.

7.Guo, and ning Zhang. "Study on circular economy education in rural areas in China." International Conference on Logistics Engineering, Management and Computer Science (LEMCS 2014). Atlantis Press, 2014.

8.Alonso-Almeida, María del Mar, et al. "Sustainable development and circular economy: The role of institutional promotion on circular consumption and market competitiveness from a multistakeholder engagement approach." Business Strategy and the Environment 29.6 (2020): 2803-2814.

9.Korhonen, Jouni, Antero Honkasalo, and Jyri Seppälä. "Circular economy: the concept and its limitations." Ecological economics 143 (2018): 37-46.

10.Ghisellini, Patrizia, Catia Cialani, and Sergio Ulgiati. "A review on circular economy: the expected transition to a balanced interplay of environmental and economic systems." Journal of Cleaner production 114 (2016): 11-32.

11.Kirchherr, Julian, et al. "Conceptualizing the circular economy (revisited): an analysis of 221 definitions." Resources, Conservation and Recycling 194 (2023): 107001.

12.Shao Xi., & Yun-jie, H. (2010, March). The research of the development principles and development model of circular economy. In 2010 International Conference on Challenges in Environmental Science and Computer Engineering (Vol. 1, pp. 97-100). IEEE.

13.Jun, Han, and He hang. "Development of circular economy is a fundamental way to achieve agriculture sustainable development in China." Energy Procedia 5 (2011): 1530-1534.

14.Wu, Tsui-Jung. "A critical reflection of Christian anthropocentrism and ecological crisis from a Taoist perspective: A contribution to Christian-Taoist eco-theology." (2013).

15.Suárez-Eiroa, Brais, et al. "Operational principles of circular economy for sustainable development: Linking theory and practice." Journal of cleaner production 214 (2019): 952-961.

16.Lehmann, Steffen. "Optimizing urban material flows and waste streams in urban development through principles of zero waste and sustainable consumption." Sustainability 3.1 (2011): 155-183.

17.Stessel, Richard I. Recycling and resource recovery engineering: principles of waste processing. Springer Science & Business Media, 2012.

18.Velenturf, Anne PM, and Phil Purnell. "Principles for a sustainable circular economy." Sustainable production and consumption 27 (2021): 1437-1457.

19.Park, Jacob, Joseph Sarkis, and Zhaohui Wu. "Creating integrated business and environmental value within the context of China’s circular economy and ecological modernization." Journal of Cleaner Production 18.15 (2010): 1494-1501.

20.Kumar, Bhavesh, et al. "Green finance in circular economy: a literature review." Environment, development and sustainability 26.7 (2024): 16419-16459.

21.Chen, Chong-Wen. "Improving Circular Economy Business Models: Opportunities for Business and Innovation: A new framework for businesses to create a truly circular economy." Johnson Matthey Technology Review 64.1 (2020): 48-58.

22.Jo, Donghyuk, and Chulhwan Kwon. "Structure of green supply chain management for sustainability of small and medium enterprises." Sustainability 14.1 (2021): 50.

23.He, Ziwen, Ziyang Chen, and ao Feng. "Different types of industrial agglomeration and green total factor productivity in China: do institutional and policy characteristics of cities make a difference?." Environmental Sciences Europe 34.1 (2022): 64.

24.Kim, Chang H., Adrian TH Kuah, and K. Thirumaran. "Morphology for circular economy business models in the electrical and electronic equipment sector of Singapore and South Korea: Findings, implications, and future agenda." Sustainable Production and Consumption 30 (2022): 829-850.

25.Shankar, Sanjiv. "Direct tax incentives to power sector in India: a case study." Indian Journal of Public Administration 63.1 (2017): 104-123.

26.Song, Ying, et al. "Analyzing the role of high-tech industrial agglomeration in green transformation and upgrading of manufacturing industry: The case of China." Journal of the Knowledge Economy 14.4 (2023): 3847-3877.

27.Almasi, Ali, et al. "Assessing the knowledge, attitude and practice of the kermanshahi women towards reducing, recycling and reusing of municipal solid waste." Resources, Conservation and Recycling 141 (2019): 329-338.

28.Afsharzade, Nashmil, et al. "Renewable energy development in rural areas of Iran." Renewable and Sustainable Energy Reviews 65 (2016): 743-755.

29.Ding, Yin, et al. "A review of China’s municipal solid waste (MSW) and comparison with international regions: Management and technologies in treatment and resource utilization." Journal of cleaner production 293 (2021): 126144.

30.Park, Jacob, Joseph Sarkis, and Zhaohui Wu. "Creating integrated business and environmental value within the context of China’s circular economy and ecological modernization." Journal of Cleaner Production 18.15 (2010): 1494-1501.

31.Ngan, Sue Lin, et al. "Prioritization of sustainability indicators for promoting the circular economy: The case of develo countries." Renewable and Sustainable Energy Reviews 111 (2019): 314-331.

32.Akenji, Lewis, et al. "Policy responses to plastic pollution in Asia: Summary of a regional gap analysis." Plastic waste and recycling (2020): 531-567.

33.Rodríguez-Espíndola, Oscar, et al. "The role of circular economy principles and sustainable-oriented innovation to enhance social, economic and environmental performance: Evidence from Mexican SMEs." International Journal of Production Economics 248 (2022): 108495.

34.Visvanathan, Chettiyappan, and Venkatachalam Anbumozhi. "Evolutionary acts and global economic transition: progress of the circular economy in ASEAN." industry 4 (2018): 67-105.

35.Korhonen, Jouni, Antero Honkasalo, and Jyri Seppälä. "Circular economy: the concept and its limitations." Ecological economics 143 (2018): 37-46.

36.Troschinetz, Alexis M., and James R. Mihelcic. "Sustainable recycling of municipal solid waste in develo countries." Waste management 29.2 (2009): 915-923.

37.Misra, Krishna B., ed. Clean production: environmental and economic perspectives. Springer Science & Business Media, 2012.

38.Tietenberg, Tom, and Lynne Lewis. Environmental and natural resource economics. Routledge, 2018.

39.Zhang, Qinrun. "China's policy and finding ways to prevent collapse in WEEE processing in the context of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal." International Environmental Agreements: Politics, Law and Economics 21.4 (2021): 693-710.

40.Chen, Hui Ling, et al. "The plastic waste problem in Malaysia: management, recycling and disposal of local and global plastic waste." SN Applied Sciences 3 (2021): 1-15.

41.Zhang, Karen S. Turning Trash into treasure-a comparative study of E-waste recycling in China and the US through systems thinking. Diss. PhD thesis. Virginia Polytechnic Institute and State University. Available at:https://karenszhang. com/wp-

content/uploads/2020/11/Turning-Trash-Into-Treasure. pdf.(Accessed: 1 April 2021), 2020.

42.Cook, Ed, Costas A. Velis, and Michiel Derks. "Plastic waste reprocessing for circular economy: A systematic review of risks to occupational and public health from legacy substances and extrusion." (2020).

43.Qu, Shen, et al. "Implications of China's foreign waste ban on the global circular economy." Resources, Conservation and Recycling 144 (2019): 252-255.

44.Hsing, Hao-Jan, et al. "Hazardous wastes transboundary movement management: a case study in Taiwan." Resources, conservation and recycling 40.4 (2004): 329-342.

45.Dias, Pablo, Andréa Moura Bernardes, and Nazmul Huda. "Ensuring best E-waste recycling practices in developed countries: An Australian example." Journal of Cleaner Production 209 (2019): 846-854.

46.Cimpan, Ciprian, et al. "Central sorting and recovery of MSW recyclable materials: A review of technological state-of-the-art, cases, practice and implications for materials recycling." Journal of Environmental Management 156 (2015): 181-199.

47.Kapitonov, Ivan A. "International regulation of the restriction of the use of environment." Periodicals of Engineering and Natural Sciences 7.4 (2019): 1681-1697.

48.Hao, Shijiang, et al. "An overview of China's recyclable waste recycling and recommendations for integrated solutions." Resources, Conservation and Recycling 134 (2018): 112-120.

49.Kotenev, Alexander, et al. "Optimization of customs and tariff policy instruments in the system of import substitution in the agricultural sector." E3S Web of Conferences. Vol. 164. EDP Sciences, 2020.

50.Behrens, Arno, et al. "The material basis of the global economy: Worldwide patterns of natural resource extraction and their implications for sustainable resource use policies." Ecological Economics 64.2 (2007): 444-453.