

Circular Economy: An Ethical and Sustainable Economic Development Model

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Summary

The traditional linear economic growth model pursues solely the GDP growth, and economic development is achieved at the expense of the environment and the resources. This model has obvious ethical flaws and has been viewed as a “from cradle to grave” approach. Differently, the circular economy development model establishes the principles of “Reduce, Reuse and Recycle” as its core contents in order to achieve sustainable development, which has been viewed as a “from cradle to cradle” approach. Circular economy engenders new ethical relationships, and proposes new ethics of pro-

duction and consumption. Circular economy implies the holistic value principle and sustainable value principle, which can remedy the ethical flaws of the traditional linear model. As an ethical and sustainable development approach, circular economy contributes to the Copernican change in the field of economic ethics.

Key words: traditional linear economy, economic ethics, circular economy, holistic value principle, sustainable value principle, production ethics, consumption ethics

Historically, the modes of economic growth manifest an evolutionary process, which are the crystallization of human's deepening understanding of and self-conscious choice for the relationships between economic development and environment, between economy and society, and between economy and human themselves. The pursuit of exclusive economic growth has been criticized, and the development of circular economy has become the consensus about economic development across the world nowadays. As a new economic development model, circular economy will engender new values of economic ethics. This paper will proceed along the following courses: 1) circular economy is a revolution in the history of the evolution of economic development models; 2) circular economy engenders new ethical relationships and moral appeals; and 3) circular economy implies value principles.

Circular Economy is a Revolution in the History of the Evolution of Economic Development Models

The circular economy concept was first introduced in the 1960s by American economist K. Boulding (1966), for addressing the deteriorating environmental conditions. Circular economy proposes that within the large-scale system of people, natural resources and science and technology, and in the whole process of resource input, corporate production, product consumption and disposal, the traditional linear economy whose development depends on resource consumption is transformed into an economy whose development depends on the recycling of ecological resources. Boulding (1966) analyzed the underlying causes of environmental problems and proposed that the economic development model should be transformed from one-way linear economy to a circular economy. With the concept of sustainable development put forward, people began to thoroughly explore this new economic development model. Thus, the essence of the circular economy (development model) is to alleviate environmental pollution, resource scarcity, and other conflicts as-

sociated with economic development under the traditional way. Circular economy is based on the “3R” principles, namely “reduce, reuse, and recycle”. “Reduce” principle aims to reduce the input materials and energy in the production and consumption processes. “Reuse” is the principle concerned with process, which aims to extend the life span of products and services in the production and consumption processes. “Recycle” is the principle concerned with output, which aims to reduce the amount of wastes requiring final disposal by turning wastes to secondary resources. “3R” principles are core contents of the circular economy. Circular economy is based on ecological principles and requires organizing economic activities into a feedback process of “resources – manufactured products – renewable resources”, so that resources can be rationally recycled and reused to protect the environment, reduce pollution, and achieve sustainable economic and social development. Compared with the traditional linear economy, circular economy is a revolution in the history of the evolution of economic development models.

First of all, the circular economy advocates an economic development model harmonious with the earth. The traditional linear economic development is a one-way linear process of “resources – manufactured products – pollution emissions”. With the industrial development, the expansion of production scale, the increase of population, and the weakened self-purification capacity of the environment, environmental problems and the resource shortage crisis have become increasingly aggravated. The traditional linear economy achieves the “extensive pattern” of economic growth through the process of turning resources into wastes, at the expense of the environment and resources (Zhu 2007). In contrast, the circular economy follows the laws of ecology, and promotes the rational use of natural resources and environmental bearing capacity. Further, the circular economy approach adopts the feedback process of “natural resources – products and services – renewable resources,” achieves economic development on the basis of continuous recycling and reuse of materials, and harmoniously integrates economic

system into the natural ecosystem (Des Jardins 2002: 68). The circular economy principle reveals that the economy is not the entire contents of human activities, but only a subsystem of the natural ecosystem; in this way, economic activities are ecologically implemented.

Secondly, the circular economy is an economic development model that pays all its attention to the quality of development, use of science and technology, resource savings and clean production. The traditional linear economy is quantity-oriented economic growth model. Concerning the relationship between exploitation and conservation, more importance is attached to exploitation while conservation is ignored, with the sole aim of pursuing GDP growth. Given the relationship between speed and efficiency, more importance is attached to speed while efficiency is ignored. Given the relationship between quantity and quality of development, more importance is attached to quantity while quality is ignored. “Three High and One Low” (high exploitation, high consumption, high waste emissions, and low efficiency) is the characteristic of this economic growth model. Concerning the relationship between the economy and the environment, the traditional linear economy is an environmentally unfriendly economic growth model. In contrast, the circular economy promotes scientific, resource-saving, and clean economic development. It emphasizes low input and high utilization of natural resources, and low waste emissions, which is beneficial to promote pollution prevention and the control of whole production process. The circular economy is an environment-friendly economic development model and may fundamentally eradicate the long-term sharp conflicts between the environment and economic development.

Finally, the circular economy adopts “green” evaluation system and indicators, such as the green GDP. In accounting and evaluating economic development, the traditional linear economy adopts pure economic indicators such as the GDP and GNP. Such evaluation system fails to capture the negative impact of economic growth

on the environment. On May 20, 2011, "China Youth Daily" reported a piece of news titled "GDP Giant caused Lead Poisoning". According to the report, 332 people lived in Deqing County, Huzhou City, Zhejiang Province, suffered from lead poisoning due to pollution. The cause lies in that the local government approved a large number of high-polluting enterprises into operation in order to gain GDP growth, while ignored the consequent environmental problems. This pollution incident is caused by Zhejiang Haijiu Battery Co. Ltd., which has 1,000 employees and generates an annual output value of 450 million RMB. According to local media reports, this company was the largest enterprise in Deqing County and passed the inspection of environmental protection before it went public in 2010. Apart from this case, several other notable lead poisoning incidents were reported by the media in 2011, including the incident of lead poisoning in children in Huaining, Anhui province, and the lead poisoning case in Taizhou, Zhejiang province. In recent years, lead poisoning incidents with relatively large impact continued to occur across China. Most of these happenings were closely related to the pollution caused by Lead-acid battery industry and Secondary Lead industry, with children at a greater risk. These evidences indicate that the traditional linear economy not only brings negative impact on the sustainable development of the national economy, but also causes serious physical and psychological harm to the people. This economic growth approach harms people's health and damages the environment; thus, it must be changed. The circular economy promotes a green evaluation system (e.g., green GDP). The term "green GDP" represents the value of GDP after deducting the costs of environmental resources and costs for environmental resources protection. Such accounting and evaluation method can promote repeated and rational use of the resources, and achieve the optimization of industrial portfolio and maximization of economic efficiency. Meanwhile, it will encourage consumers' green consumption and promote green production of the industry. However, currently consensus has not

been reached on the calculating system for green GDP across the globe (Feng and Yan 2007).

To sum up, the circular economy advocates the harmonious relationships between economy and environment, economy and ecology, and economy and society in order to alleviate the constraints of natural resources on economic growth and human welfare development, and to achieve sound mutually supporting development relationship among economy, society, and environment. Therefore, the circular economy provides a strategic development model for the transformation from traditional economy to sustainable economy since the industrialization. It may fundamentally eradicate the long-term sharp contradictions and conflicts between economic development and, resources, environment, and society, which can meet both natural laws and economic laws.

Circular Economy Engenders New Ethical Relationships and Moral Appeals

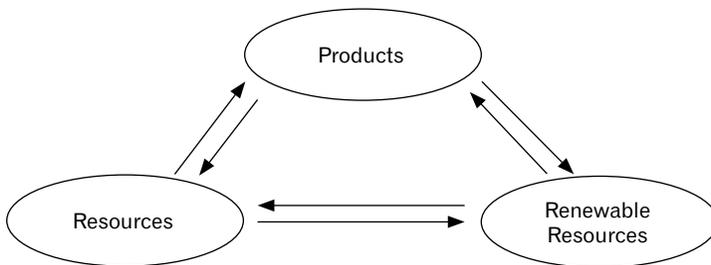
The operational structure of circular economy comprises three levels: the corporate-level (micro-level), the inter-firm level (meso-level), and the social level (macro-level). There are interlocking industrial chains across these levels. In this way, the integrated whole of the economic operation as well as new ethical relations and moral appeals different from traditional linear economy are formed. The three operational levels not only reconstruct industrial relations, but also rebuild new ethical relationships within a corporation, between corporations, and between the corporations and the society.

Internal micro-level cycle within a corporation

At the corporate-level, circular economy concept requires cleaner production process, green management, “zero waste”, and “zero pollution”. Also, it requires the implementation of the “closed loop of materials flow” and multi-level energy use, transformation of wastes generated by the manufacture of one product to raw materi-

als for another product, and, according to different objects, establishes water cycle, multi-level use and recycling of raw materials, energy conservation and energy reuse, and control and comprehensive utilization of “three wastes” and other sound circulation systems. Cleaner production is a new development strategy and is the cornerstone for the development of circular economy at the corporate level.

Circular Economy Chart



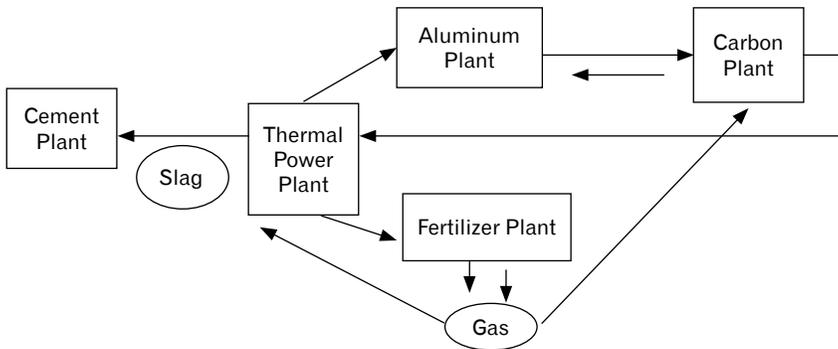
Regional meso-level cycle between corporations

“At the regional level, the circular economy is mainly represented as eco-industrial network of symbiotic enterprises or industries, namely wastes will be interchanged between enterprises within regional eco-industrial park” (Dai 2006: 11). The eco-industrial park is an important carrier for the development of the eco-industry and circular economy at the inter-firm level (meso-level). Based on proper design of logistics and energy within the industrial park, it simulates natural ecosystems, forms symbiosis networks between enterprises, transforms wastes of one enterprise to raw materials of another, makes cascade use of energy and water resources, and has apparent characteristics to fully use resources and energies to protect and improve the quality of ecological environment.

Taking Henan Shangdianlvy Group, a circular economy demonstration project of Henan province, China as an example, the group follows the circular economy principle and constructs the eco-in-

dustrial chain of “aluminum – electricity – heat – fertilizer”, it is a new form of industrial organization which combines circular economy principles and industrial ecology principles. The Group has several subsidiaries and places Thermal Power Plant at the central importance, supported by the aluminum plant, fertilizer plant, cement plant, and other related divisions, through the circulation and flow of materials and energy along the industrial chain within a relatively fixed area. Also, the Group transforms the secondary energy from previous link to primary energy of the next link and to achieve maximization of materials and energy use and minimization of wastes emission. In this way, a relatively closed energy circulation chain and environmental protection industrial chain are formed to improve energy efficiency, reduce environmental pollution. Thus, the efficiency of circular economy is reflected.

“Aluminum – Electricity – Heat – Fertilizer” Ecological Flow Chart



Major cycle at the socio-economic level

The practice of circular economy at the socio-economic level in China is mainly represented as several nationwide ecological circulation systems, such as the treatment of water pollution in the “three rivers” and “three lakes”, the project of returning farmland to forests

and grassland, desertification and solodization control project, energy structure optimization project, and ecological agriculture development project. Construction of national circular economy demonstration regions at Tianjin and Shanxi provinces provide some other examples. The industrial chain which takes “resources – products – renewable resources” at its core is an important guarantee to achieve the major circulation of resources at the social level. The circular economy development at the social level is mainly led by the national and local governments.

It can be seen that the three levels of circular economy model are essentially an industrial structure and its integrated circulation system, which promote the clustering of corporations and finally a combination of corporations and the society. Correspondingly, mutual-connection, mutual-restraint, and mutual-promotion economic relationship chains and ethical relationship ties are formed. Accordingly, circular economy ethics have many new moral appeals which are explained in details as below.

Cleaner production, emission reduction and resource savings

The cleaner production concept required by the circular economy is an ecological and green pollution-control method for the whole production process. It continuously applies the environmental strategy of overall prevention to production process, products, and services, so as to increase eco-efficiency and reduce human and environmental risks. Cleaner production concept adopts “prevention” as the primary guideline and requires enterprises to prevent from the source of pollution, take the responsibility to promote clean production and reduce emissions. It also requires enterprises to start from several aspects (such as product design, raw material selection, reform and optimization of production processes and technical equipments, materials recycle and wastes utilization) to comprehensively consider economic efficiency and environmental protection and

strive to achieve maximum economic efficiency with minimum resources. By strengthening management and technological innovation, and actively adopting harmless or less-harmful new production processes and technologies, “cleaner production” effectively reduces the consumption of raw materials and energies, achieves “less input, more output and lower pollution”, eliminates environmental pollutants as much as possible in the production process, and achieves the goal of “energy saving, consumption reduction, pollution reduction and efficiency improvement”. The corporation should give priority to the principle of “reduce”. In short, cleaner production should be promoted according to the concept of eco-efficiency in order to efficiently utilize all resources and energy, and ultimately achieve the economic operation model of harmless pollution emission or zero emission.

Consistency of environmental protection and business development

Natural resources are not inexhaustible. The absorbance and purification capacity of the natural environment for human wastes is also limited. The development achieved at the expense of resources and environment is not sustainable. The circular economy aims to pursue the harmony and unity between development and environment, which values the overall and long-term interests of human development and achieves leaping economic development with minimal environmental costs. Natural resources and ecological environment are the cornerstones of a country’s economic and social development. All raw materials supplied for essential human living needs and construction demands are the gifts of nature. For a corporation, environmental protection is its most important and obligatory social responsibility, especially for China, a developing country undergone rapid development of industrialization and urbanization, shortage of resources per capita, and the unimproved environmental degradation.

Integration of short-term and long-term interests

With China's rapid economic development in recent years, serious cases of environmental pollution and ecological destruction frequently occur, mainly caused by short-term behaviors of corporations. In order to pursue profit maximization, some companies overly exploit social and corporate resources and even cause ecological destruction and environmental pollution. In terms of the development model, they value short-term output while overlook long-term investment, which not only harm the interests of our generation, but also excessively consume resources of future generations. Short-term behaviors bring harm to the society in many aspects: firstly, over-exploitation and over-use of resources, and environmental pollution cause "resource bottleneck" and the scarcity of basic resources. Secondly, the scarcity of basic resources causes disconnection between macro and micro views of social development. Short-term behaviors will inevitably lead to catastrophic damage to the natural and social resources, and restrict the optimization of the economic structure and the transformation of economic development model. Such value orientation that harms long-term development and the common interests of the whole society is undesirable and should be abandoned. For a corporation, the important carrier for circular economy development at the micro-level, it is essential to correctly handle the relationships between short-term and long-term interests, and between local and overall interests, and to adhere to the core concepts of environmental protection. The mutual interests are more important than the interests of a single corporation or an individual, and social value is more critical than corporate profits to realize the common development. Unsustainable short-term behaviors should be firmly abandoned. Only in this way can the sustainable development of a corporation, the economy and the society be achieved.

Co-existence and co-prosperity, mutual benefits and the win-win situation

The eco-industrial parks (EIPs) are an important carrier of the circular economy development at the meso-level. Companies within the same EIP share and exchange raw materials, energy, information, technology, personnel, and capital, and achieve the win-win situation of the ecological environment and the economy through integrated management and cooperation systems of the above resources. The traditional linear economy only emphasizes certain exchange relationships between companies, without considering the specific contents of such exchange relationships, which is the major difference between the EIP concept of the circular economy and the traditional economy. As demonstrated in the above chart of the ecological chain of the Henan Shangdianlvye Group, the thermal power plant assumes the central role, supported by the aluminum plant, fertilizer plant and cement plant and other related industries. Different companies on the same eco-industrial chain or within the same EIP form a closed, inseparable, and interdependent economic relationship. Such relationship can be described as “bound together for prosperity or loss”. The companies within an EIP should properly deal with the economic relationship between companies in the same industry or different industries with mutual cooperation and support, and create greater potential for their own development while taking the responsibility for other companies on the same industrial chain. In this way, a sound-developed ecological platform is established; the co-existence and co-prosperity, mutual benefits and win-win situation is realized.

The circular economy development model engenders new ethical relationships and moral requirements different from the traditional linear economy, which, on the one hand, requires that corporations within an ecological region form mutually recognized values, and on the other hand, proposes new production methods, life styles, and behavior and ethical codes for the corporations and citizens.

Value Principles Implied in Circular Economy

Distinguished from traditional linear economy, the circular economy's inherent ethical spirits are holistic and sustainable value principles, which entail new understandings and due ethical attitudes to resources, environment, production, consumption, interests and justice, and embody human's active spirits in terms of the ecological constraints and the sense of responsibility for future mankind. The value principles of circular economy are ethical spirits which intend to ease the tensions between economy and environment, as well as economy and society. As a result, these principles help to realize the harmonious co-existence of economy, resource, environment, and society.

The holistic value principle of circular economic ethics is based on the doctrine of worldwide universal connection and new recognition of the economy. Engels said that dialectics is the science about "universal connection". The world is a unity formed by numerous concrete things and their processes, and each of them is an organic component and link of such totality. In this way, from individuals to complicated systems, from non-life cycles to life cycles, to the society, to the infinite universe, a universal connection network mutually connected and linked by infinite layers and intermediate links is formed; and the existence, movement and change of each individual can be a concrete embodiment of the universal connection. Therefore, the development of any specific thing must take into account relevant aspects of its connection; otherwise, it can only be abnormal development, and abnormal development is inevitable to be short-term. As a development model, circular economy's intrinsic, objective, and core requirement is to consider the structural influence of economic activities on relevant environments, resources, and society. In this sense, we can say that the ethics of the circular economy has the value of "universal ethics".

Specifically, the holistic value principle of circular economic ethics is to deem the economy as an open subsystem of a large scale

global system, which is relatively independent, at the same time interacts and mutually restricts with environment, ecology, society and the whole human system and relevant subsystems. Economic development must be in harmony with overall system. As mentioned above, the circular economy is focused on increasingly serious contemporary environmental issues and aims to find a way to promote economic development with less resource consumption and non-deteriorated or even improved environment. Therefore, it is critical that human beings give up the notion of one-way development which only concerns economic efficiency and growth rate, and shall pay more attention to the carrying capacity of resources and the environment as well as the value of the ecological environment and human. Brown, a renowned American scholar, pointed out that: “The translation from ecology-destroying economy to sustainable economy depends on the Copernican change in the field of economic ethics, understanding that the economy is only a part of the Earth’s ecological economy, and continuous economic development can be achieved only by adjusting the economy to be compatible with ecosystem” (Brown, 2003: 4). Daly, a well-known ecological economist stated that “existing dominant economic model completely rules out ecological costs” (Daly, 2001: 7), which leads to the market’s failure to reflect the truth of the ecology. Boulding, an American economist, published an article named *A Science – Ecological Economics*, in which he first proposed the concept of “Ecological Economics”. Based on ecological principles, this theory holistically studies the mutual influence and restraint between ecosystem and productivity system, and the combination of ecology and economy, reveals the essential connections between the nature and the society, changes traditional patterns of production and consumption, and saves all available resources.

Among elements of traditional linear economic operation, ecological environment element is used as unlimited and unrestricted available resources, and this is the theoretical reason for people to pursue economic efficiency at the cost of deteriorated ecological en-

vironment. The holistic value principle not only makes up previous lack of understanding for the value of the environment and natural resources, but also breaks through strict boundaries of ecological ethics and economic ethics, which require that economic development must respect the law of ecology. From the perspective of spatial dimension, holistic value principle also indicates that resources and environment problems have become a global topic. According to the requirement of holistic view of values, any country or nation shall be deemed as local. Therefore, it is important for the contemporary people to have a global vision to correctly understand and transact the relationship between the local and the globe, comply with international conventions, fulfill moral obligations and undertake global responsibilities. Thus, holistic value principle embodies inherent ethical spirits which aim at harmonious development of economy, society, environment and human, and advocate new systemic and holistic ethics integrating economic value, ecological value, and human value.

The sustainable value principle of the circular economy ethics is also implied in this economic development model. The holistic value principle and the sustainable value principle reflect the inherent ethical spirits of the circular economy based on spatial and time dimensions. The former reflects the nature of universal connection of things, and the latter reflects the nature of eternal development essence of things. So, what is development? What kind of development do human beings need?

The goal of circular economy is to achieve the sustainable development of mankind. At present, whether developed countries, less developed countries, or developing countries, are all concerned about development issues. So, what is development? How to develop? From the view of inherent requirements, the goal of the circular economy is sustainable development. Its essence is to, through cleaner production, emission reduction, and resource conservation, achieve economic growth and realize the goal for the sustainable development of natural ecology, society, and economy. Traditional

linear economic growth model is a GDP-oriented economic growth model. It has obvious ethical flaws; for instance, it fails to consider quality and efficiency of economic growth, ignores the internal consumption of economic “exterior” and ignores to fully consider human development demands and social welfares. Such flaws make this economic growth model hardly achieve sustainable development of economic society. Brown stated that “a market-oriented economy should be turned into an ecology-oriented economy” (Brown 2003: 88). If we cannot achieve such translation, we will pay a heavy price. Reference to his book, the author quoted former vice president of Esso which is the company developed Norwegian and North Sea oil fields – Stein Dale’s view to express his viewpoints: “The centrally planned economy collapsed due to failing to make the price express the truth of economics, and free market economy may collapse due to failing to make the price express the truth of ecology” (Brown 2003: 24). The circular economy is based on ecological economics and requires sustainable development of the resource, environment, and healthy life. For the selection of economic growth models, under the circumstance of severe resource shortages and environmental pollution, the understanding of human beings is continuously deepening. In 1990, a consensus is generally reached all over the world that sustainable human development is the full meaning of the development, and human beings must take a sustainable development path. The sustainable value principle is people-oriented, which can satisfy the needs of contemporary people without harming the capacity of future generations to meet their needs and thus can make the human beings have a continuous development.

The sustainable value principle reflects new ethical attitudes and requirements for production, consumption, nature, and other different aspects. The sustainable value principle of the circular economy requires us to achieve sustainable development throughout all processes.

Firstly, we should establish new production ethical codes. The value principle of sustainable development requires the main body of circular economy – enterprises, 1) to abandon the traditional production model of mass production, consumption, and wastes, 2) to adopt a sustainable economic growth model – the circular economy development model, and 3) according to the principles of industrial ecology, to combine the enterprises or divisions within certain regions, build industrial chains and ecological parks, and forms industrial symbiosis networks between enterprises. Thus, the enterprise must adhere to production ethics codes such as cleaner production, emission reduction and resource conservation, unify enterprise development and environmental protection, integrate short-term and long-term interests, fully consider the bearing capacity of ecosystems, and save and recycle natural resources, in order to maximize the economic efficiency.

Secondly, we should establish new consumption moral values. How to consume? What kind of consumption concepts should be held? With regard to such questions, the sustainable value principle of the circular economy is totally different from traditional linear economy. Marx once said that: “human will consume every day since appearing on the stage of the Earth, whether prior to the production or in the process of the production” (Marx and Engels 1972: 191). Different models of economic development lead to different consumption ethics. Compared to traditional linear economic model which pursues “hard production and exhaustive consumption” (also called “cradle-to-grave economy”); the circular economy development model is essentially an ecological economy, which aims to increase recycling and re-utilization of the resource. Therefore, it is also called “cradle-to-cradle economy” (Braungart and McDonough 2002). From the view of consumption links, the former is an unsustainable consumption pattern, while the latter is a sustainable consumption pattern. Two kinds of consumption patterns show fundamental differences in terms of ethical dimensions and moral appeals. The circular economy development model requires enterprises and

social members to consume (resources) according to moderate consumption, green consumption, and other ethical guidelines, to consider recycling of the wastes while consuming and select a green lifestyle adapted to environmental bearing capacity, and to establish new concepts about recycling production and consumption. The consumption concept of circular economy implies sustainable value principles, reflects inner unity of economic value, ecological value, and moral value, emphasizes the harmonious and sustainable development of economy and society, and establishes an environment-friendly economic ethics under conscious social selection. The consumption ethics of circular economy is formed based on the theory of ecological ethics and people's sense of social responsibility. We can say that the consumption ethics of circular economy is a forward-looking and advanced ethics.

Thirdly, we should establish new natural ethics. The circular economy is built on the basis of ecological principles and natural laws and is an economic development model co-evolving harmoniously with the Earth. Opposed to traditional industrial economy which deems the natural environment as "materials taking field" and "garbage dump", the operation structure of circular economy not only regards environment as available resources, but also considers it as the basis for human beings to survive and a benign circle ecosystem which must be properly maintained. The development of circular economy requires the improvement of science and technology, which not only shall consider the bearing capacity of nature, but also must take into account relevant repair function for the ecosystem, to meet the demands of total value of human society, benefit the whole ecological environment of human beings, balance human interests and natural rights, and guarantee the justice of resource rights for contemporary and future generations. This is the ethical attitude of sustainable value principle towards the nature implied in the circular economy.

The sustainable development value principle of the circular economy takes the ability to promote sustainable development of

economic society as a standard to judge good and evil, advocates to obtain the interests based on the survival of human beings and sustainable development of long-term common interests of human beings, refuses the principle of economy priority and opposes to achieve quick success and get instant benefits by short-term behaviors. Thus, the existence of sustainable value principle is the difference between the circular economy ethics and the traditional linear economic ethics.

The circular economy ethics are a new theory of economic development ethics and have very rich contents. The holistic value principle and the sustainable development value principle contain the concept of environmental and ecological ethics, and new production and consumption ethics, which reveal the internal ethical spirits of the relationships among economy, ecology, environment, and social development, reflect the relationship of co-existence and co-prosperity between the economy and the nature, and the economy and the society, embody people-oriented, comprehensive, coordinated and sustainable scientific development concepts, and integrate human's economic demands and ecological laws, temporary needs of contemporary people and long-term interests of future generations. Based on development laws of economy, ecology and human beings, integrated with the thoughts from such disciplines as ecology, economics, environmental science and ethics, the doctrine of circular economy ethics organically unifies economic values with ecological values and moral values. Therefore, circular economy ethics should not be understood within the mere scope of economics. We should examine the significance of the circular economy ethics from the perspective of the economic and social development in the 21st century and value it as a new doctrine of economic development ethics for coordinating the relationship between economy and environment, economy and resources, as well as economy and society.

REFERENCES

- Boulding, K.E., 1966, *The Economics of the Coming Spaceship Earth*, s. 3–14. In: H. Jarrett (Ed.) *Environmental Quality in a Growing Economy. Resources for the Future*. Johns Hopkins University Press, Baltimore, MD.
- Braungart, M., McDonough, W., 2002, *Cradle to Cradle: Remaking the Way We Make Things*, 1st edition. New York: North Point Press.
- Brown, L.R., 2003, *Eco-Economy: Building an Economy for the Earth*, 1st edition. Shanghai: Eastern Publishing Center (in Chinese).
- Dai, B.J., 2006, *Practical Cases of the Circular Economy*, 1st edition. Beijing: China Environmental Science Press. (in Chinese).
- Daly, H.E., 2001, *Beyond Growth: the Economics of Sustainable Development*, 1st edition. Shanghai: Shanghai Translation Publishing House. (in Chinese).
- Des Jardins, J.R., 2002, *Environmental Ethics: An Introduction to Environmental Philosophy*, 3rd edition. Beijing: Peking University Press. (in Chinese).
- Feng, Z., Yan, N., 2007, *Putting a circular economy into practice in China*. „Sustainability Science”, 2 (1), 95–101.
- GDP Giant Suffered from Lead Poisoning*, 2011, „China Youth Daily”, 20 May (in Chinese).
- Marx, K., Engels, F., 1972, *Collected Works of K. Marx and F. Engels*, Volume 2. Beijing: People's Publishing House. (in Chinese).
- Zhu, D., 2007, *China's Circular Economy and Sustainable Development*. Beijing: Science Press (in Chinese).