

## Circular Economy in China and Lessons to Vietnam

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### Abstract:

*This research provided an overall review of literature on the circular economy in China and the sustainable development strategy elsewhere. The current practice of the strategy is being carried out at the micro, intermediate and macro levels covering production, consumption, waste management, and various public support programs to promote, regulate, monitor, and evaluate CE's successful implementation. Also, this thesis gives several recommendations for Vietnam in the implementation of CE such as better management of importing secondary raw materials as well as hazardous waste, more concentration in the transition to the circular economy through laws and policies. Moreover, it can be said that economic benefits should be closely tied with the responsibility, in order to successfully apply circularization.*

**Keywords:** International trade, circular economy, China, Vietnam

### 1. Introduction

The fundamental need for an alternative to the traditional linear model of growth has led to the Chinese interest in the circular economy was piqued in the 1990s by Germany and Japan's recycling laws. In 2005, China's State Council issued a policy paper recognizing the economic and environmental risks of the nation's heavy resource exploitation, and acknowledging the circular economy as the principal means of dealing with them. The country's planning agency, the National Development and Reform Commission (NDRC) and bodies such as the Ministry of Environmental Protection have since developed circular economy principles and promoted exemplars of industrial symbiosis, such as at the Rizhao Economic and Technology Development Zone.

Contrary to Europe, USA, Japan, in China, the CE implementation is promoted within a national program as it is considered part of a wider policy for socioeconomic transformation and development, capable of ensuring harmony between society and environment. In the latter economic areas, CE is mainly recognized as a strategy for waste management or for implementation of environmental policies at the maturity stage of economic development. It has set targets, introduced financial measures and passed laws to promote a circular economy. CE in China having its implementation is structured following both a horizontal and a vertical approach. Chinese national governmental policy aims to transform not only the industry but also the socioeconomic organization of the society at all levels. The top down approach of the Chinese national strategy is also reflected on the instruments used, that are mainly of "command and control" rather than market as in the European, Japanese or American policies. The vertical approach in China implies the shift of CE from the low level of analysis micro (company or single consumer level) to the higher hierarchical level (e.g. eco- industrial parks) and macro (cities, provinces and regions) while the horizontal dimension implies a link between "industries, urban infrastructures, cultural environment, and the social consumption system". It is one of the few governments to have a circular economy strategy and law, and the concept has featured prominently in both the 12th and 13th Five-Year Plans. The Chinese government has been consistently pushing for a "circular economy" as early as 2006. Chinese government has built the foundation for the growth and development of the recycling industry through ambitious initiatives incentivizing companies. By 2020, China aims to increase the recycling rate of large wastes to approximately 55%, to institute recycling reforms in 75% of national industrial parks and 50% of provincial industrial parks (Linster M. and Yang, C. (2018). Challenges hindering the development of the circular economy in China gives foreign industry pioneers the opportunity to bring in their skills and expertise.

China's idea of circular economy has its own characteristics. First, China's circular economy is an idea about the economic pattern in respect of nature rather than an idea about environmental management in some other countries, because China hopes to reduce resource consumption and pollutant production at sources and in the whole process by changing the economic pattern. It also hopes to achieve win-win in both economy and environment by circular economy instead of 'economy without recycle' or 'recycle without economy'; therefore the department proposed for planning circular economy as a whole in China is the State Development and Reform Commission which has a comprehensive nature instead of environmental management departments in some other countries. Second, China's circular economy not only aims at garbage economy or 3R economy for treating solid waste in respect of objects but at all scarce resources involved in China's economic development, including water, land, energy, materials and corresponding waste; to a certain extent, it is of more urgent significance for China to develop circular economy which deals with consumption of water, land, energy and other resources and control of related pollutants. Third, China's circular economy comprises different space levels in respect of scale and includes circular economy of individual enterprises, industrial parks and regions, etc. Fourth, China's circular economy stresses progressively increased practice forms on the following three levels in respect of pattern and emphasizes the need to develop from low-level recycle of waste based on ecological efficiency (to reduce consumption and pollution) to high-level recycle of products and services based on ecological effects (to prevent consumption and pollution).

China is the only country that has developed the concept of CE and has practiced it as a development strategy on a large scale. This explains the reason for the emphasis that is placed on the case of China in investigating current CE practices. Ideally, successful implementation of the CE policy must take place simultaneously at all three levels of aggregation: micro, intermediate and macro. This is emphasized in a number of studies (Geng and Duberstein 2008; Su et al., 2013; Yuan et al., 2006; Zhu and Huang, 2005). Su et al. (2013) categorize ongoing CE practices into four areas of production, consumption, waste management and other support. The authors maintain that the complexity of practices increases with the aggregation level suggesting that the micro and intermediate levels are vibrant as compared to the macro level. Inspired by Su et al.'s (2013) categorization each combination of these levels and areas are now described.



Figure 1. Circular economy development in China

## **2. Circular Economy in China**

### **2.1. CE at micro level**

At the low level of aggregation and activity area, namely production of firms and agricultural products, producers are encouraged and required to adapt cleaner production methods and eco-designs. Clean production refers to low levels of emissions, while ecodesign refers to incorporating environmental aspects in production processes designs and products that are efficient and sustainable through innovative designs and production lines. China's Cleaner Production Promotion Law was enacted in 2003 (Geng et al., 2010). The law addresses key issues related to generating pollution and the efficient use of resources at all stages of the production process. Implementation for heavily polluting enterprises to reduce their energy intensity, material use and negative externalities is compulsory (Hicks and Dietmar, 2007). The former State Economic and Trade Commission and State Environmental Protection Administration had published 3 batches of 'National Guidance Catalogue of Cleaner Production in Key Industries' in 2000, 2004 and 2006. The catalogue contained 141 cleaner production technologies related to the metallurgy, oil chemical industry, textile processing, mechanics, non-ferrous metals, construction materials, power and coal industries, which supplied important guidance for the cleaner production in China. A survey conducted by Yu et al. (2008) on electrical and electronic manufacturing firms showed little evidence of eco-design in their products. Considering consumption and waste management areas, green consumption and use of environmentally friendly services and products is promoted and the generated wastes have to be recycled into new production stages as part of an industrial eco-system.

### **2.2. CE at intermediate level**

At the intermediate level, the CE practices include developing eco-industrial parks and eco-agricultural systems. These must be complemented with other measures such as environmental friendly designs of industrial parks and managing the waste accordingly. Building waste trading systems and venous industrial parks for resource recovery from green products are other measures. By applying the concept of industrial symbiosis, eco-industrial parks utilize common infrastructure and services. This enables clusters of firms to cooperatively manage resource flows and trade industrial by products which decrease environmental externalities and reduce both firms' and the nation's dependency on resources. The reduced overall production cost raises industrial productivity and competitiveness. A similar effect is achieved from the eco-agricultural system (Chertow, 2000). In parallel with eco-industrial and eco-agricultural parks, the program includes green design for residential communities to create an eco-friendly habitation environment. Again the focus is on regulation and management of urban consumption of energy, water and land to reduce their use, as well as on managing and recycling of waste water and solid waste to improve the quality of life and general public well-being (Zhu and Huang, 2005).

### **2.3. CE at macro level**

The CE practice at the aggregate macro level requires forming complex and extensive cooperative networks and active cooperation between industries and industrial parks including primary, secondary and tertiary sectors in production areas and in the residential sector. In the context of China, the macro level is aimed at major cities or region/provinces. The objectives of the 3R principles can be achieved by proper design and management of urban infrastructure and sub-urban industrial production and agricultural layouts, as well as through inventive public programs to phase out energy intensive and polluting technologies and replacing them with environmental friendly technologies and activities. Regarding the consumption area, Stahel (1986) and Zhu (2005) suggest a system of renting and a service economy as a shift from a system of selling and buying to just utilization of products. The suggested system will reduce resources' needs and the wasted and lower production capacity will be compensated for by the creation of a new service economy. An urban symbiosis as an extension

of an industrial symbiosis which needs to be developed to take care of waste management through transfer of waste materials for environmental and economic benefits from recycling and reusing (Geng et al., 2010).

The last area of other support includes initiatives from governmental and nongovernmental organizations covering all areas of production, consumption and waste management at all levels of aggregation. China regulates the environment and CE implementation through two agencies: the Ministry of Environmental Protection (MEP) and the National Development and Reform Commission (NDRC). The former is in charge of the National Pilot Eco-industrial Park Program with the main focus on the intermediate level, while the latter is in charge of the National Pilot Circular Economy Program focusing on both intermediate and macro levels (Zhang et al., 2010). As part of other support, a number of laws and policies related to CE have been introduced in the recent decade including the cleaner Production Promotion Law of 2003, the amended law on Pollution Prevention and Control of Solid Waste in 2005, various initiatives to facilitate implementation of CE and the circular Economy Promotion Law in 2009. Regulations and initiatives are further strengthened by the development of environmental and non-governmental organizations to change attitudes towards the environment in society. This is facilitated by investments in education, providing information and active public participation to increase environmental awareness.

### 3. Current Vietnamese import policies in transition to CE

Since Vietnam have not launched any specific laws or national strategies for CE, import policies of Vietnam released is the way to limit the foreign waste import, to control the growth in waste imports and reduce the impact on industries. It can be seen clearly in some below decision.

#### 3.1. Tariff measures

Circular No.38/2013/TT-BTC

It is issued by The Vietnamese Ministry of Finance which amended its preferential import duties on various commodities. These measures were enacted by the Vietnamese Government to assist with new environmental protection measures that were issued through Resolution 35/NQ-CP. The highlighted point can be seen in table below:

Table 1. Preferential import duties on various commodities

Goods	Import duty rate (adjusted) %	Import duty rate (before) %
Polymeric styrene category	5	3
High impact polystyrene (HIPS)	5	3
Synthetic filament yarn (except sewing yarn)	3	0
Copper-coated carbon steel wire for inflatable pneumatic rubber tires	3	0
Nylon-6 yarns	7	5

Source: Circular No.38/2013/TT-BTC

#### 3.2. Evaluation of CE adaption in Vietnam in terms of import policy

Along with these legal documents, the Vietnamese Government also has issued a strategy on improving activities for environmental protection. This includes the implementation of Agenda 21, a program to control

industrial and urban pollution, a national program on forest protection, and a program to eliminate ozone depleting substances. In its Strategic Plan for Socio-Economic Development for 2000-2010 Period, the Government has instructed ministries and branches to develop detailed plans for environmental protection while designing their development strategies and master plans. The results is that Vietnam prohibits both imports and exports of wastes except imports some non- hazardous recyclable waste.

Firstly, it could be said that the import export duty policies of Vietnam do not cover specific provisions on environment protection as other countries. All the banned import-export goods or those goods which need import-export permits aim only at protecting people's health, social safety, national security, and preserving traditional 25 cultural values and practices. Some of these bans or requirements also relate to environmental protection, but not specifically and clearly enough. They are even too immature in comparison with the lists of environment unfriendly or environment-polluted products stipulated in multilateral agreements on environment protection or in other relevant documents of international organizations such as the United Nations, Food and Agriculture Organization and the World Health Organization. It appears that Vietnam leaves itself open to environment unfriendly products or products that might affect the environment. Here are some examples:

- The United Nations has listed over 700 items of goods that must be strictly controlled in use, trade and production. This list excludes poisonous food additives and some pharmaceutical products belonging to the banned list by the Food and Agriculture Organization and the World Health Organization.
- The Basel Convention has produced two lists, A and B, of wastes which need to be controlled strictly in trade and cross-border transportation.
- The Montreal Protocol includes 6 annexes to prohibit the use, production and trade of chemical substances, facilities and products which may cause ozone depletion.
- There are a number of other commodities such as children's stuff, household utensils, cosmetics, detergents, textile, garments, paints, electronic devices, leather shoes etc. Which contain environmentally-unfriendly substances and needs strict control in their use, production and trade.

Secondly, apart from insufficient non-tariff measures to control goods, as mentioned above, the system of import-export duties in Vietnam has not yet worked out the relevant tariff rate for environment-unfriendly products. For instance, Vietnam has set up zero tariffs for up to 264 different chemical substances, and the average tariffs of chemical substances is only 6.2%. About 150 agricultural products have tariff rates of between 0 to 5%. This means that Vietnam's tariff and non-tariff policies do not include relevant measures to control and regulate the importation of environment-unfriendly products.

Thirdly, for recycling or manufacturing materials from recycled scrap, the quality and requirements for recycled materials (domestically collected or imported) and products are not governed by any legal documents. Standards for recycled wastes are not only lacking but also scattered. Depending on sector and specific requirements, it is essential to refer to standards applied in such countries and regions as Canada, USA and EU. However, these foreign standards are not officially applied, but required by foreign importers for Vietnamese exports. There are no standards applied to recycled products.

Moreover, challenges to scaling up the Circular Economy in Developing Countries such as Vietnam can be clearly found out as follows:

#### Capacity and finance constraints

The speed of urbanization in many developing countries has led to problems with the establishment and enforcement of appropriate regulations and mandatory standards to govern circular activities. In India, for example, more than 95 per cent of e-waste is processed in urban slums by untrained workers who lack adequate protective equipment and are exposed to a wide range of toxins (India administrative statistics). Without strong

governance frameworks, there is a risk that developing countries will install cheaper but limited-quality technologies and equipment, including those mis-sold under the guise of a CE. There is evidence, for example, that waste-to-energy technologies reliant on incinerators are regularly sold in developing countries that lack proper testing facilities or oversight for the use of such equipment. In some cases, these technologies would not be approved for use in the countries in which they are made. Some stakeholders in the EU, meanwhile, have expressed concerns that dramatically increasing recycling and creating downstream markets for secondary materials could mean that toxic and hazardous materials that might otherwise be banned from consumer markets will be kept in circulation. The use of recycled plastics can bring health risks, for example via plastic waste streams that contain harmful pollutants such as brominated biphenyl ether (BDE) flame retardants, while water reuse is only beneficial for health if sufficient standards are in place.

#### Access to finance

Activities associated with ‘linear’ (i.e. Non-circular) resource extraction and processing often account for the bulk of financing, foreign exchange earnings and foreign investment in lower-income countries. Resource-led development – which focuses on leveraging the potential investment in, and revenue and jobs from, natural resource sectors – has been a popular theory among major donors and international organizations in recent years. OECD analysis of private-sector resources mobilized for development reveals that almost half of these resources are focused on energy, industry, mining and construction. Restructuring economies to accommodate more ‘circular’ activities will require a major shift in infrastructure, industrial processes and innovation priorities. Developing countries are already facing a major infrastructure investment gap; many lower-income countries lack even basic solid-waste management infrastructure. Yet current investment in modernizing solid-waste management processes and establishing the ‘reverse logistics systems’ needed to scale up the reuse of materials and products is inadequate: the European Investment Bank (EIB), for instance, invests relatively little in solid-waste-related activities. Access to finance for existing industry may also be needed to support the transition to CE activities. Without careful planning, many facilities and sites will struggle to function in the move to more resource- efficient economic activity.

#### Access to technology

Significant progress has been made on the technological foundations for CE activity. A growing range of data and information technologies are making CE solutions practical for the first time in a range of sectors. There has also been a step- change in the technology available to improve supply chain traceability: satellite- based GPS technology, the rise of the ‘Internet of Things’ (IoT), low-power wireless technology, advances in big data and ‘distributed ledger’ blockchain technology, and developments in artificial intelligence and machine learning – all are transforming companies’ ability to track and trace commodities and products and monitor environmental conditions in real time. In many developing countries, however, the ‘digital divide’ remains a very serious problem, with more than 4 billion people still without access to the internet, and 2 billion people without a mobile phone. Many CE approaches do not require costly technology investments and are already widely accessible in developing countries. Household-level and farm-waste composting, for example, are well proven, low-cost and non- technology-intensive means of tackling food waste and reducing the need for fertilizer.

#### Informal-sector employment

The vital role played by informal labour is one of the most important areas of divergence when comparing CE approaches in developing and developed countries. Developing economies typically have a more fragmented private sector, with considerably higher shares of informal-sector employment, than advanced economies. Almost the employed population in developing regions is in informal employment, and waste management is among the principal activities of the informal sector. Where previously waste-pickers may have been well equipped to process simpler industrial materials, increasingly they are dealing with e-waste – often made up of complex composites – and lack the skills and technology to optimize recycling and repair processes. With the

informal sector capturing a large share of material flows, more formalized processes that may be better suited to recycling e-waste cannot source enough feedstock to recycle these products in an economical way. For example, numerous formal facilities in China have been unable to compete with the informal sector due to the latter's established network, low operating costs and convenience of collection (Geng, 2008)

#### Resource-intensive economies

For many developing countries, natural resources – defined broadly here to include both extracted minerals and agricultural goods – account for a large proportion of GDP, employment or both. For countries with large hydrocarbon and mineral reserves, models of extractives-led growth have long been promoted by national governments, multilateral organizations and donor agencies. Resource revenues have been a key driver of development gains and economic growth to date. For many countries, moreover, agriculture continues to be the single largest source of domestic employment. While the CE has the potential to create new opportunities for value addition and employment – many of them local – the fundamental decoupling of economic growth from resource use nevertheless implies significant changes to industrial strategy. This is likely to meet resistance from governments and industry. Without meaningful dialogue at the national and international level around future growth pathways, there is a risk that natural resource-exporting countries will see the CE not as an opportunity for economic diversification but as a threat to continued growth.

#### Infrastructural deficits and urbanization

Key to visions for a CE in developed countries has been the opportunity to tap into an economy's existing stock of materials – through the dismantling and recycling of e-waste, organic waste and construction materials, for example – and so displace primary production and its associated energy requirements and greenhouse gas emissions. Resources available in unused assets and products, and in abandoned buildings and infrastructure, can be brought back into circulation in a number of ways. Governments may incentivize the reuse of existing buildings over new builds: for example, according to UK administrative statistics, the UK could remove the 5 per cent value-added tax (VAT) charged for converting buildings into housing, or introduce fiscal measures such as 'landfill taxes' to encourage remanufacturing over waste disposal. In developing countries, however, the focus remains on investing in new infrastructure and building stock in order to support rapid industrialization and urbanization. Critical infrastructure has not kept pace with rapid urbanization in many developing countries, and city slums have borne the brunt of this expansion. At the same time, developing countries also have far smaller stocks of materials for reuse and recycling than high-income countries do.

#### **4. Lessons to Vietnam in terms of adapting CE**

In order to successfully apply circularization, Vietnam needs to have many aspects of improvement. From China's experience, Vietnam can draw on valuable lessons when making control against the global waste flows to Vietnam. During the case study research, it is showing that Chinese import ban have had negative impacts on global value chain as well as global response. Vietnam should make the import policies selectively and carefully.

Firstly, related to legislation, at present, Vietnam have not had the complete law and policies to support the circularization. The policies-makers should consider the circular economy as a national program. It is necessary to have the cooperation of government, manufacturers and customer. Government should issue and adjust legal documents, stipulate the implementation and guide the implementation of the new management system of wastes, of which classifies clearly responsibility of stakeholders as proposed, particularly the authority agencies; invest in researching and issue standards of recycled materials and products; focus on common and particular materials such as metals (black and colored metals), paper, plastic (including rubber); establish the recycling fund with full functions and legal foundations, with the participation of related authority agencies in order to support and supervise financially the lengthening of responsibility of the manufacturers and consumers; establish and apply regulations of "greening" of the supply chain of international materials as well as policies of

“green” moral in the society; increase the capacity and establish the human resources serving the system of waste management. Manufacturers should broaden contacts with standards and criteria agencies of developed countries to be better informed about environmental criteria and requirements stipulated in various national environmental codes and international environment conventions due to limited access to this sort of information.

Secondly, related to secondary materials, Vietnam cannot release import waste ban as China did. Such practices made secondary raw materials a bad reputation and lowered the potential for the development of a circular economy in general. Therefore, Vietnamese policies-makers should seek for other solutions. We should reopen to import for high quality recycled material and seek global collaboration, which would not only ease the shortage of recycled plastic material but also save time for other economies to build new waste treatment plants. At the same time, we need to control the quality of recycled material at the beginning from the exporting countries by which loading photos for each container must be sent on or before the cut-off date for each booking in order to be reviewed in a timely manner. Shipment will be suspended and potentially returned for any failure to do so. For regulations and rules on imported material scrap, it needs to formulate standard system for recycled material scrap and products and develop adequate technology standards. Therefore, Vietnam needs other countries’ active support for its environmental efforts through technical assistance programs, clean technology transfer, and facilitation of Vietnamese accession to technology banks. Only then can Vietnam enjoy full and effective access to advanced technology and respond fully to environmental concerns. For example, The Trade and Sustainable Development provisions of EU FTAs offer a useful basis for developing e-waste related Aid for Trade strategies. For instance, the FTA with Vietnam (awaiting signature and conclusion) states that Parties may work together on trade-related aspects of green growth strategies and policies, including sustainable production and consumption. Despite banning imports of used electrical and electronic equipment (EEE) in 2013, Vietnam faces a significant e-waste issue, with increasing amounts of e-waste being generated domestically, in addition to illegal exports due mainly to its proximity with China. The informal e-waste handling system is very active and plays an important role in rural economic development but has significant negative consequences on the environment and public health. Aid for Trade mechanisms could be put in place to help Vietnam develop its e-waste treatment infrastructure, to ensure safer management and participate in making Vietnam an official and safe e-waste global trading platform.

Thirdly, related to hazardous waste, which China prohibited these kind of goods completely is very useful. Vietnam will need to strengthen controls on imports and exports of recyclable wastes and to get tougher in enforcing them. We should manage to import of environmentally-unfriendly products during trade and investment liberalization and facilitation, in bilateral and multilateral economic ties. To do that, Vietnam policy-makers should study and apply correctly environment-related regulations of the WTO such as stipulations of the Agricultural Association, the SPS Agreement, and technical standards to ensure regulatory consistency with the WTO and recognition of measures by WTO member countries, establishing a close co-ordination mechanism between commercial agencies and environmental agencies, participate in international conventions on environment and implement their stipulations in national policies on trade management. In this process, it is necessary to establish technical cooperation programs with international environmental agencies and organizations so as to ensure the effective adoption of those provisions on environment (of MEA Agreements) into our commercial laws and policies, and avoid cumbersome stipulations that block trade activities; and collect and disseminate information of the UNCTAD and the WTO working teams on trade and environment to the ministries and branches concerned, especially those involved in control of imports-exports and enterprises. This is to raise their awareness about the trading of products detrimental to the environment and of other countries solutions to these problems so that they can design relevant policies for Vietnam.

## 5. Conclusion

CE as a concept was introduced in 1990 with its 3R principles of reducing, reusing and recycling energy, materials and waste. CE is seen as offering a viable alternative development strategy to ease tensions between desired national economic development and environmental concerns. It also helps address existing resource scarcity and pollution problems and enables enterprises and industries to improve their competitiveness by removing green barriers in their international trade relations. China's rapid industrial development and persistent high rate of economic growth since its open door policy at the end of the 1970s have led to increased awareness about China's resource scarcity and environment degradation. CE is viewed as a viable solution to countries' resource scarcity and environmental problems.

A growing body of literature has emerged during the last two decades on various theoretical, methodological and empirical aspects of CE and its implementation. China has made serious efforts to intensively and on a large scale implement CE with the objective of providing long term and sustainable solutions to its severe resource scarcity and environmental degradation problems.

This research provided an overall review of literature on the circular economy in China and the sustainable development strategy elsewhere. The current practice of the strategy is being carried out at the micro, intermediate and macro levels covering production, consumption, waste management and various public support programs to promote, regulate, monitor and evaluate CE's successful implementation. Also, this thesis gives several recommendations for Vietnam in the implementation of CE such as better management of importing secondary raw materials as well as hazardous waste, more concentration in transition to circular economy through laws and policies. Moreover, it can be said that economic benefits should be closely tied with the responsibility, in order to successfully apply circularization.

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