

## TOWARDS A CIRCULAR ECONOMY

### نحو نموذج للاقتصاد الدائري

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#### ملخص :

النمط الخطي "استخراج، انتاج، رمي" قد بلغ حدوده. إن وتيرة الاستعمال الحالية للموارد ستجعلنا في حاجة إلى كرة أرضية أخرى لتلبية حاجياتنا في المستقبل. قد حان الوقت للتوجه بسرعة لاقتصاد دائري يستعمل الموارد أفضل استخدام. الاقتصاد الدائري يظهر كنموذج قابل لفصل النمو الاقتصادي عن استخدام الموارد والآثار البيئية المترتبة. 1.0  
هذا المفهوم يفضي إلى استخدام مناهج و أولويات حسب كل بلد، الهدف من دراسة بعض التجارب الدولية الرائدة في هذا المجال تقديم بعض الأفكار لإثراء النقاش حول موضوع الاقتصاد الدائري.  
الكلمات المفتاح : الاقتصاد الدائري؛ الاقتصاد الخطي ؛ الآثار البيئية.

#### Abstract:

The linear patterns "producing, consuming disposing" is reaching its limits. At the current trend of resource use, another planet is necessary to satisfy our needs in future. It is time to speed up the transition towards a more circular, resource efficient. Circular economy appears as a model that should contribute to decoupling the economic growth from the resource use and its environmental impacts.

This concept gives rise to different approaches and priorities according to countries. The objective of studying some international experience, is feeding the current debate on the issue.

**Keywords:** Circular economy; linear economy; environmental impacts.

## I- Introduction

The current linear economic model is based on the triple "extraction, production, throwing", which is based on large quantities of cheap materials and affordable energy, leading to industrial development and generating an unprecedented level of growth.

However, the severity of price volatility, the risks associated with supply chains and the increasingly severe pressures exerted on natural resources have led to a re-examination of the patterns of material and energy use by heads of institutions and political officials, so many believe that it is time to take advantage of the opportunities Provided by the circular economy.

The circular economy is of a restorative and regenerative nature and tends to preserve the intrinsic value and quality of the products, components and materials at each stage of their use. This concept distinguishes between biological and technical courses. This new economic model aims to separate global economic development from the consumption of limited resources. The circular economy responds to the pressing resource challenges faced by institutions and countries, as it can generate growth, create jobs, and reduce

environmental impacts, including carbon emissions. While voices are rising in favour of a new economic model based on a visionary vision, a positive bias of technological and social factors contributes to the circular economy.

Circular economy procedures have received considerable attention from public authorities and economic agents in recent years, as they respond to the need to address the scarcity of resources and the high prices of raw materials at the economic and environmental level, but also for negative indicators, especially climatic, Methods of production and consumption.

Through the foregoing, the question is as follows:

Is the circular economy an alternative to the linear economic model?

The following sub-questions fall under this problem:

1. What is the concept of circular economy?
2. What are its limits ?
3. What are the public policies that are pursued internationally in the context of the circular economy?

### **1.1. The concept of circular economy:**

The circular economy is an emerging concept as its definition is yet to be determined globally. In this axis we will try to shed light on this concept and its performance, its limits, the various concepts similar to distinguishing between them and the concept of circular economy.

#### **1. Definition and performance of the circular economy:**

The emergence of the circular economy is due in part to the boundaries of the linear economy, the paradigm that has been evident in our societies since the Industrial Revolution (Stéphanie Harnois, 2017), and is illustrated in Fig. 01 below. In fact, this model where progress is dependent on resources and leads almost directly to the production of waste has reached the Earth's endurance capacity (IESDCE, 2015). Reaching a linear economy has created the need to rethink our practices and the economy as a whole. The circular economy of Quebec appeared in the form of university research. It was named the circular economy by economists Pearce & Turner (1990) (Stéphanie Harnois, 2017).

The Institute of Environment, Sustainable development and circular economy (IESDCE, 2015) defined the circular economy as: "A system of production, exchange and consumption aimed at improving the use of resources at all stages of a commodity's life cycle or service, in circular logic, while minimizing environmental impact and contributing to the welfare of individuals and groups)."

The circular aspect of closing life cycles on an ecosystem basis is aimed at minimizing waste and consumption of resources, allowing the remaining materials to be easily integrated. In this context, the operation of the remaining materials is an essential element. In addition to decoupling economic growth from excessive use of resources, this model aims to create values in all areas of sustainable development (social, economic and

environmental) (IESDCE, 2013).

Figure 01 below represents the concept and performance of the circular economy. We observe through the form the continuous loop that allows the creation of positive value through the reintegration of material and energy.

This model needs several strategies and engines to achieve the goals that are underlined. Among them, extending the life of the products leads to the optimum use of materials and energy. This can be reflected by a preference for repair, re-employment and use, allowing the loop to be re-used. This may enhance the ecological design, which is to develop a product while minimizing its environmental impact throughout its life cycle, so that it can be easily integrated into a new cycle, for example, by easy dismantling (Stéphanie Harnois, 2017).

The economy of advantage is also an important strategy where it aims at changes in consumption level, the principle is clear, lies in the sale of advantage and not the material commodity. This strategy aims at the purchase of goods by the property, and is responsible for continuity and management at the end of the life of the products. Thus, minimizing wastage and products easily merge into a new loop (IESDCE, 2013).

In addition to extending product life, eco-design and feature economy, the Environment and Energy Management Agency identifies four (04) other pillars (AFEP, 2017): recycling, sustainable supply, responsible consumption and industrial and regional ecology.

Sustainable supply is related to the pattern of exploitation and extraction of resources in order to optimize resources for waste reduction and environmental impact (ADEME, 2017).

In the case of responsible consumption, the environmental effects of the entire life cycle of a product or service are taken into account in the consumer options (ADEME, 2017).

Another essential pillar is cooperation between the agents of the same region, where the waste of some agents can enter another ring in the same territory. This strengthens the regional economy (Stéphanie Harnois, 2017).

The concept of a circular economy is broad, and its performance depends on the opportunities and constraints of each region as it is located at the local level. Its location imposes some challenges, because it imposes a change of habits, business models, changing consumer behaviour and adapting to the legal framework (IESDCE, 2015).

## **2. Various Similar concepts**

As already mentioned, the circular economy is evolving, which makes confusion with some other related concepts. Many of these concepts can represent strategies or engines for the operation of the circular economy. Such as ecological design, feature economy.

### **A. Industrial ecology:**

This concept is defined as "a multidisciplinary approach, the sum of means such as ecological design, clean technology and life-cycle analysis aimed at optimizing the use of natural resources (Synergie Québec, 2013). This means converting an industrial system in a way that allows for the management of supply and residual materials as a natural

ecosystem, so that waste losses are minimal. Thus, industrial ecology is an important ingredient for the embodiment of the circular economy (Sauvé, S., Normandin, D. and McDonald, M. 2016).

### **B. Industrial Symbiosis:**

Represents a network of institutions and groups intertwined with each other through exchanges of materials, water and energy. It is therefore an integrated set embodying industrial ecology.

### **C. Reduction at source, reuse, recycling, recovery and disposal**

This concept is a series of priority activities to extend the life of the product. Then, the reduction preference is at source, re-hiring, and then recycling and finally restoring when the last option is left. Of course, disposal is the end of the loop, sometimes necessary, but used as the last solution. This concept is very important as it also finds its place in the embodiment of the circular economy. It would be preferable to reintegrate the products into a new cycle for better use of resources (Stéphanie Harnois, 2017).

### **F. Lack of waste**

This concept aims to divert as much waste from disposal as possible and is usually applied at the city level. There are many programs across the world in various ways to reach this common goal. To tolerate the principle of **reduction at source, reuse, recycling, recovery and disposal** is necessary in this movement; the circular economy finds its place as a model that works to achieve this goal by merging key agents such as industries and institutions (Environment, Energy and the Sea 2015).

### **H. Sustainable development**

Is development that meets the needs of the present without weakening the ability of the future generation to meet its requirements. Sustainable development is based on a long-term vision that takes into account the interconnected nature of the environmental, social and economic dimensions of development activities (Stéphanie Harnois, 2017).

Through this definition we conclude that the concept of sustainable development is broader than the circular economy, so that the latter is a promising conduit for development.

## **1.2. Circular economy in the world**

Through this axis we will try to offer international experiences to draw some general lessons to contribute to the current debate on the topics of the circular economy.

### **1. Circular Economy in Japan**

Japan is a very active country in the embodiment of the circular economy due to its lack of natural resources and the lack of space, especially in the field of storage and dumping of waste (Richard Rouquet, Doris Nicklaus, 2014). Japan has strengthened the adoption of principles based on 3R \*, since 1991, the promotion of the use of Recyclable Resources Act, supplementing the Recycling Act of 1970. The latter was extended in the year 2000 to 3R and renamed the Law on Effective use of resources. These two laws are framed by the Basic Law to create a circular company that defines the general principles

of the circular economy. This is associated with a master plan to create a circular company, the first in 2003, while the second covers the period 2008-2015. These diagrams form the basis for the embodiment of programs and define a set of non-binding goals (François Sana, 2014).

The Japanese legislature is characterized by a sectoral and product-type implementation to take into account the specificity and maturity of the various recycling industries, depending on the sectors concerned. In fact, Japan voted on a set of laws on recycling for special categories of products. This legislature is also characterized by a constant dynamic of change; the objectives are continually refined to integrate technological development and results achieved. The entire system is based on regular focus mechanisms with specialists (François Sana, 2014).

The 3R policy is supported by two programs: "Top-runner" and "Eco Town" program. "Top-runner" is a programme to improve the efficiency of the program established in 1998. Instead of specifying the minimum energy performance, the specific standard for each product category represents the best current performance. The rest of the category products should conform to this performance in a specific period. The standard is continually reassessed. Eco-label «E-mark» is widely used, reflecting the effectiveness of the product for reference brackets. The effectiveness is monitored by a committee of experts whose powers are to impose sanctions if the goals are not achieved. The program is effective, accounting for about 20% of the goal of the energy economics at the national level (Richard Rouquet, Doris Nicklaus, 2014).

The program embodies "Eco Town" from 1997 to 2007. The main objective was to create an eco-3R industrial centers with recycling centers with the latest technology to drastically reduce the waste dump, but also to revive/transform some economic sectors (such as heavy Industries) and develop a division with excellence in recycling. In order to get Label Eco Town, the local community and institutions should develop a blueprint that will be analyzed according to their economic sustainability and the criteria of innovation or creativity. The project must be a model for other groups and use the best available technologies (François Sana, 2014).

In 2000, Japan ratified the Green Procurement Promotion Act (<http://www.env.go.jp/en/laws/policy/green/1.pdf>).

Japan is more advanced in this field than Germany, the country is more developed in Europe with Sweden with regard to green procurement. The law concerns government procurement, Parliament, agencies, and other government institutions. Local communities are not obligated. A database about products in various types is available with its environmental effectiveness (François Sana, 2014).

## 2.China

In China, the circular economy is a national priority in the highest echelons of the state, as it provides answers to the main challenges of development facing this country, which lies in dependence on raw materials and energy, reducing greenhouse gases and environmental impacts. The circular economy was transferred in 2004 from the National

Environmental Protection Administration to the National Commission for Development and Reform, which explains that it is not just an environmental policy but a national priority. The circular economy is directed and subject to the direct supervision of the State Council (François Sana, 2014).

In 01/01/2009, the Circular Economy Promotion Act, inspired by German and Japanese models, came into force, highlighting 3R. Its scope extends to total resources, i.e. not just waste, and inserts raw materials, energy, water and real estate. This law deals with a wide range of agents: state, local groups, institutions, consumers, non-governmental organizations. Local communities play an important role, as the law obliges them to embody the circular economy at the local level by preparing regional plans for the development of the circular economy. Also highlight clean technology, industrial ecology and re-industrialization, especially the automotive industry. The concept of the advantage economy and the problematic life-cycle extension of products have not been addressed. The circular economy should be integrated in itself into other regional and national schemes. Priority is also given to projects for the efficient use of resources in respect of bank loans and investment schemes. We also note the existence of tax incentives, with increasing pricing depending on the use of resources (water, Electricity...) and eco-label. The State Council published in 23/01/2013 the first National circular economy scheme. This plan includes 18 numbered targets for the recycling and reuse market and the raising of resource productivity. Highly practical, sector-specific and technology-based business hubs to get them. The scheme devotes special chapters to industrial ecology and eco-industrial centres (François Sana, 2014).

To evaluate the projects, the Chinese government developed in 2007 a system of indicators called «Circular Economy Evaluation Indicators System» which contains three levels of assessment: district level, municipal level and level of industrial complexes. Four types of indicators to be determined for each level: (François Sana, 2014).

- Energy consumption‘
- recycling use‘
- Pollution measurement‘
- Social development.

Since 2007, all parties concerned (institutions, industrial complexes and cities) should measure the effectiveness of their projects using the indicator system.

### **3 .France**

In France, the circular economy concept emerged during the Granel Environment Forum in 2007(Institute of Planning and Development, 2013). The Directorate-General for Risk Prevention and its policy section on waste Management are tasked with identifying directives for general waste management policy, including recycling objectives. National Board of Waste Established sub-economics subgroup. The General Commission for Sustainable Development Promotes industrial ecology and a directory is being published for the benefit of regional groups. For the industrial side Le CGDD follows the work of

the Strategic Committee for the Ecological Industries Especially the industry initiatives of the recycling channel based on the "circular Economy Charter". Finally, L'ademe, in the future investments, supports up to 210 million euros to develop innovation and industrial solutions to boost reuse, recycling and material assessment, eco-design and eco-industry development (François Sana, 2014).

Since February 2013, a circular Economy Institute has established, among its objectives, the adoption of a circular economic law in 2017, in parallel with the work of this Institute, the government recorded the circular economy as a topic of discussion for the environmental recipient in September 2013 (François Sana, 2014). this forum confirmed the important regional role in the establishment Regional strategies of the circular economy (François Sana, 2014).

### **1.3. The boundaries of the circular economy**

#### **1. Technical Limits**

The circular economy faces the complexities of product flows destined for recycling and also the degradation of materials, in fact the field extracts lose their purity since the early stages of production. After recycling the material deteriorates. Recycling is therefore a limited process and the used article cannot be integrated into a production or consumption cycle. Another technical limit is possible in the diversity of urban solid waste compounds, which prevent a green economy project from being broadly reflected. For example, the composition of wastes located in various cities in China depends on the urban level and the living of the population as well as the current industry. Fig. 04 represents the types of waste in 13 Chinese cities.

#### **2. Economic and political boundaries**

Moving from a linear to a circular economy can discourage short-term economic growth and curb the development potential of certain activities. Also, recycling is economically profitable only if the demand is high on the material (François Sana, 2014).

Guiding policies for the development of the circular economy must be established. An effective pricing system should be established to strengthen this economy through the pricing of raw materials that are promising and not products. These prices affect the overall price system in production and consumption. The cost of exploiting natural resources must be greater than the cost of renewable and circular resources and the latter's consumption is more profitable than the consumption of natural resources. In short, it is necessary to reorganize the system of rabies and pricing (François Sana, 2014).

### **Conclusion**

Green economy is a viable model for development, neutral for the environment and within the local reach. Evolve on condition that there are several factors combined and with a systematic approach.

This concept is characterized by its ability to deal with all economic agents. In fact, the



largest capital companies can be impressed by the various opportunities that the circular economy offers to create value and reduce costs. As for public services, you will be interested in the goal of zero waste provided by the circular economy. Finally, replacements can take care of the advantage economy and the sustainability values offered by the circular economy.

Also, the circular economy is reflected in the diversification of projects and curricula. Its results are shown with the help of interdisciplinary elements of policy, technical development, economics and physical boundaries to achieve unlimited recycling.

In general, the circular economy takes into account the need to focus on economic and urban activities in a wide range of relationships between humanitarian activities and the biosphere .

Through the study of some of the leading international experiences in the embodiment of the circular economy, it would be desirable to circulate at the global level.

## - Appendices

**Fig. 01 – Linear Economy**



Source : Annual Report 2015-2016 Institute ESDCE – P7. Web site :

[http://institutedec.org/DEV/wp-content/uploads/2016/11/EDDEC\\_RaAnnuel\\_2015-2016-FinalPages.pdf](http://institutedec.org/DEV/wp-content/uploads/2016/11/EDDEC_RaAnnuel_2015-2016-FinalPages.pdf) consulted on 23/02/2018.

**Fig.03 - Fundamentals of circular economy**

### Practices underpinning the Circular Economy



PhD2050, 2014 according to ADEME, 2013.

Source :

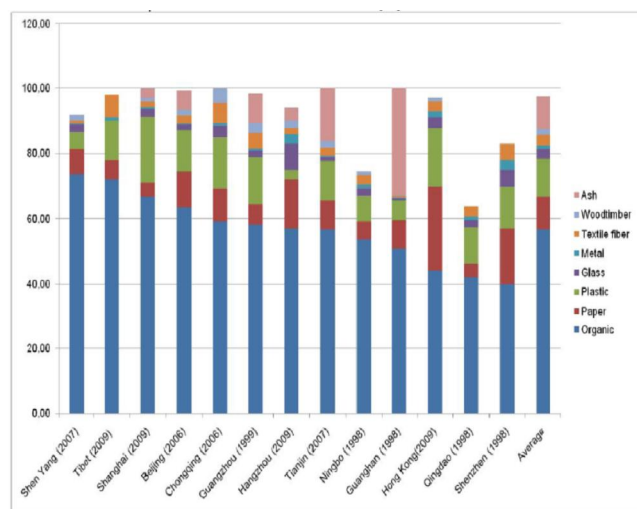
<https://phd2050.wordpress.com/tag/circular->

**Fig. 02 – Circular Economy**



Source : Annual Report 2015-2016 Institute ESDCE – P7. Web site : [http://institutedec.org/DEV/wp-content/uploads/2016/11/EDDEC\\_RaAnnuel\\_2015-2016-FinalPages.pdf](http://institutedec.org/DEV/wp-content/uploads/2016/11/EDDEC_RaAnnuel_2015-2016-FinalPages.pdf) consulted on 23/02/2018.

**Fig. 04-Types of waste in various Chinese cities**



Source : François Sana - Circular economy: complete change of economic paradigm? - analysis note Nov 2014- web site :

<http://www.pourlasolidarite.eu/sites/default/files/publications/files/na-2014-economie-circulaire.pdf> consulted



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[idf.fr/fileadmin/NewEtudes/Etude\\_1036/Economie\\_circulaire\\_Ecologie\\_industrielle\\_IdF.pdf](https://www.iau-idf.fr/fileadmin/NewEtudes/Etude_1036/Economie_circulaire_Ecologie_industrielle_IdF.pdf)- visited on:18/02/2018.

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