и экономического регионального развития, и поддержки его уровня конкуренции. «Развитие стратегического управления экономикой региона на основе государственно-частного партнерства предполагает необходимость согласования интересов публичного и частного сектора и разработки инструментов, обеспечивающих достижение данной задачи. Базовым инструментом при этом служит разработка и принятие концепции развития государственно-частного партнерства, в которой необходимо официально закрепить основные формы и принципы реализации совместных проектов, направления государственной политики по развитию партнерства (внедрение нового механизма развития экономики и разработка новой модели финансирования ГЧП-проектов)» [2].

Используйте метод SWOT-анализа для среды реализации ГЧП и учета конкретных обстоятельств, связанных с экономическим кризисом и санкциями. Основным фактором развития проектов ГЧП является политическая поддержка государства и стремление создать условия, основанные на существующей экономической реальности и социально-экономических задачах. Институт партнерства. В то же время существующие экономические трудности негативно сказываются на реализации проекта, снижая финансовые возможности предприятия и ограничивая его внешними источниками финансирования.

В то же время экономические санкции ограничивают возможность сотрудничества с иностранными компаниями и организациями, тем самым снижая потенциальную скорость развития института.

Таким образом сотрудничество частных партнеров с государством — это возможность получения стабильного дохода и расширения политического влияния, а также форма корпоративной социальной ответственности.

1. Колмаков В.В. Взаимоотношения малого бизнеса и субъектов государственной власти при реализации механизма государственно- частного 81 партнерства. Стр 118.
2. Леонова Ж.К. Сценарии развития государственно-частного партнерства в подготовке кадров для предпринимательства. - "Издательский дом ФИНАНСЫ и КРЕДИТ" (Москва), ISSN: 2073-2872, 2012.
3. Рожков Е.В. Перспективы развития государственно-частного партнерства (на примере Пермского края). Вестник Пермского национального исследовательского политехнического университета. Социальноэкономические науки, 2017.
4. Чуманская О.А. Государственно-частное партнерство в России в условиях экономического спада. Общество с ограниченной ответственностью "Издательство Молодой ученый" (Казань), №10, ISSN: 072-0297. - С.935.

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The circular economy as a conciliator between the economy and the environment:
approaches and behavior of companies

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Abstract

This work shows that with exponential population growth, the observed scarcity of resources and the degradation of the environment the limits of a linear economic model based solely on production, distribution and consumption, as well as the importance of practicing an economy of both natural resources and the environment by taking advantage of technological advances through the circular economy. It shows the attitudes of a company, using the IRIS + criteria, which must work not only for financial progress but also through investments with environmental and social impact in order to achieve sustainable development goals. By

comparisons between the pillars of the linear economy and actions in favour of the environment, it is shown that the circular economy is today a solution to reduce the negative impacts of human activities on the environment and to preserve stocks of non-renewable natural resources.

Keywords: Linear economy, circular economy, environment, Natural resources, sustainable development, demographic growth, responsible investment

Link between economic activity and the environment

During the United Nations (UN), conference on the environment held in Stockholm from June 5 to 16, 1972, the importance of protecting and improving the environment, which affects the well-being of populations and economic development. The activities of humans in their living environment can bring significant progress, notably through the invention, innovation and exploitation of natural resources.

We adopt the definition according to which natural resources are the `` stocks of materials present in the natural environment, which are both scarce and economically useful for production or consumption, either in the raw state or after a minimum of transformation. (World Trade Report 2010). Nevertheless, the misuse of resources can be harmful to living beings as well as the environment. It can be pollution of water, air and soil; profound and regrettable disturbances in the ecological balance of the biosphere, the destruction and depletion of irreplaceable resources, and finally serious deficiencies which are dangerous for the physical, mental and social health of man. (Report of the UN Conference on the Environment, 1972).

Awareness of the rational management of natural resources and the environment gained momentum with the publication of the Brundtland report in Oslo on March 20, 1987 in which sustainable development was defined as `` the capacity for man to meet its needs of the present without compromising the possibility for future generations to meet theirs. " All the efforts begun in the last century and which led at the beginning of this century to the elaboration of the Millennium Development Goals (MDGs) replaced in 2015 by the Sustainable Development Goals (SDGs) aim to bring human life and activities towards progress that takes into account the three dimensions of sustainable development: economic, social and environmental. Man remains the primary actor in the processes that lead to the manufacture of a good and the creation of a service. Through economic activity, he exploits and transforms his living environment. The economy is therefore interdependent on the environment. Natural resources must also be well managed because their stock is limited.

The current economic system is dominated by companies which punctuate economic and social life and whose main function is to produce goods or services for the markets. We will therefore study the economic models (the linear model, the circular model) used and identify the one that would promote humanity to achieve sustainable development. The economics of the production of goods is now found to be linked to the environmental economics which includes both the economics of natural resources and that of the environment.

Linear economy and its limits

The beginning of the industrial revolution in the 18th century coincides with that of the Anthropocene which is the current period of geological time, where human activities have strong repercussions on the ecosystems of the planet (biosphere) and transform them to all new (La Rousse dictionary). The economic model that has prevailed since has been characterized by an "extract-make-consume-throw" logic that consumes natural resources and energy to make products that will ultimately become waste. (Le Moigne). The latter is the linear economy which essentially consists of extracting or harvesting raw materials and using them as resources in the manufacture of products which are then marketed on a large scale through distribution networks. Once purchased by consumers, these products are thrown away

after being consumed or when they no longer serve their purpose or are simply out of date. Throughout this cycle, large amounts of resources and energy become waste. (Diagram 1)

Diagram 1. Linear economy model (Source: EDEME, France)

This economic model is not promising because it is based on a principle that aims to meet human needs without worrying about the state of the stock of natural resources. By irrationally consuming resources, humanity would expose itself to their depletion. In this model no effort is made for responsible production in order to ensure green growth which means the promotion of economic growth and development while ensuring that natural assets continue to provide the environmental resources and services on which our well-being depends (oecd.org). We can say that to say that the impacts of the linear economy are at the same time related to the economy and the environment and are observed by the overconsumption and overexploitation of resources, the scarcity of raw materials as well as the production and accumulation of waste thus having negative impacts on the environment.

Population growth

Man is an important factor in economic activity. He exploits resources to meet his needs. We will observe the evolution of the population over the years as well as its relationship with the consumption of natural resources and the environment. Based on UN data, we are seeing exponential growth in the world's population. At the time of the industrial revolution the world population was estimated at 1 billion, in 1930 at 2 billion and 30 years later at 3 billion, a growth rate of 50%. It only took 15 years to reach \$ 4 billion.

In 1987 the population was estimated at 5 billion. In 1970 the world had half of its current population (7.9 billion). This number is expected to increase by 2.1 billion by 2050, representing a growth rate of 24.3% over the next 30 years. We also observe a decrease in the rate of population growth compared to the last century where it was 100% in 40 years (3 billion in 1960 to 6 million in 1999) and this century where studies show that it would take more 200 years to be able to double the current number. (Graph 1)

Graph 1 (Source: Compiled by the authors)

Based on the principle that the more people, the more needs there are. This observed population growth should lead to an increase in the demand for resources and energy. To meet the needs of the population, changes in the environment are inevitable. For example the development of food production which involves new cultivated lands, the creation of new towns by the development of infrastructures which are the basis of deforestation. This modification in the land use patterns has an impact not only on the capacity of the soils to retain water but also on the ecology because it considerably modifies the natural habitats of the species thus causing the imbalance in the ecosystems and disturbing the biodiversity. The development of agriculture has an impact on the soil with the use of chemical fertilizers, on the environment with the use of pesticides, but also on water consumption.

To demonstrate the impact of overexploitation, overconsumption and overpopulation let us evoke the concept of global overshoot day calculated by the NGO Global Footprint Network in partnership with the World Wide Fund for nature (WWF). Global overshoot occurs when humanity's needs for natural resources exceed the regenerative capacity of the biosphere. Its calculation is based on the global ecological footprint by compiling 3 million statistical data from 200 countries. Expressed in hectares (ha) per person and per year, the ecological footprint is a tool that assesses the surface necessary to produce everything that an individual or a population consumes for his food, his home, his movements ..., as well as to absorb rejected waste. Bio capacity is defined as the capacity of ecosystems to provide useful biological materials and assimilate human-generated waste using existing management methods and extraction technologies.

So, the day of the global exceedance is the date from which the ecological footprint exceeds the biocapacity of the planet, that is to say when we have already consumed the resources that the earth is capable of producing in a year. In other words, after this date, we consume on credit outside of responsible behaviour capable of promoting sustainable development. (Graph 2)

Graphic 2. Earth Overshoot Day 1970-2020

Looking at the evolution of the global overtaking day since 1970, we see that it is happening earlier and earlier. We consume more than the earth can produce while the natural resources are not endless. This observation added to the exponential growth of the population, the constraints linked to the scarcity of raw materials which leads to an increase in their price on the market, the ecological crisis painted by climate change, the destruction of biodiversity, the disruption of nitrogen cycle, the destruction of the ozone layer, ocean acidification, overconsumption of fresh water, soil alteration, pollution by chemical agents, air pollution by aerosols (Rosckshrom et al. Al) prove the impossibility of achieving sustainable development in a linear economic model and demonstrate the need for a model linked not only to the

production of goods and services but also to the management of resources and the environment.

The circular economy as a solution

Defined by the Environment and Energy Management Agency (ADEME France) as ``a production and exchange system taking into account, from their design, the sustainability and recycling of products or their components so that they can become either reusable objects or new raw materials with the aim of improving the efficiency of the use of resources. ''

Its objective as defined by the UN is to achieve the decoupling of economic growth from the depletion of natural resources by creating innovative products, services, business models and public policies, taking into account all flows made. Throughout the life of the product to service.

The circular economy encourages practices that benefit the environment. It breaks with the linear logic which advocates only the extraction or harvesting of natural resources, the use of energy to manufacture products, their consumption and finally throw them away. It makes use of the scientific and technical knowledge acquired during the last centuries for a good exercise of economic activities. It proposes to produce differently by paying particular attention to ecology at all stages of a product's life cycle; its design, production, distribution to recycling. Henceforth, waste has new raw materials ready to be reused, upgraded as a component of another product, in short, to give it new life. For example, producing a plastic bottle from recycled plastic emits 70% less CO₂ than when making it from virgin plastic. This recycling makes it possible to significantly reduce the negative impact of plastic waste on terrestrial and aquatic ecosystems, plastic waste constitutes% of waste produced in the world, although not all are recycled, the CE by its pillars presents itself as a solution for their considerable reduction. Note that the virgin raw material is a set of materials directly extracted from the natural environment, which allow, through a succession of processing and combinations, to obtain finished and consumable products. In contrast, there is the secondary raw material which designates a set of materials resulting from the recycling of waste and which can be used as a total or partial substitution of virgin raw material. (Environment and sustainable development dictionary).

" About $\frac{3}{4}$ of all industrial energy consumption is related to the extraction or production of basic materials such as steel and cement while only about $\frac{1}{4}$ is used in transformation from raw material right down to finished products, such as machines or buildings. The reverse is true for work. Indeed, the transformation of materials into finished products requires 3 times more labour than is required for the production of the materials '(Walter Stahel, 1982). This clearly shows that the circular economy is an economy of natural resources and remaining stocks, of the environment and of energy, but also that it generates and creates new jobs. For the recycling of plastics, for example, their collection, transport, sorting, washing, crushing and all the other industrial processes that the waste (secondary raw material) undergoes are new employment opportunities that do not exist in the linear model.

The problems encountered in the linear economy such as the risk of disruption of supplies, the increase in the price of raw materials and their scarcity, the accumulation of waste which is a source of pollution of the air and water balance; the circular economy is presented as a solution by setting the following challenges:

- Reducing the consumption of natural resources

- Securing supply resources (less disruption)

- Reducing the rise in the price of raw materials

- The use of renewable energy sources

- The use of new technologies with a view to using energy and resource saving processes in all stages of production of goods and services while reducing greenhouse gas (GHG) emissions

- Sober and responsible consumption of natural resources.

Integration of the 3R principle: Reduce, Reuse, and Recycle, which simultaneously secures resources, creates jobs and protects the environment because it significantly reduces the generation and accumulation of waste. (Table 1)

Table 1

Comparison between linear and circular economy (Source: Compiled by the authors)

Linear economy		circular Economy	
Energy			The pillars of the circular economy
	Natural resources: extracting raw materials	<ul style="list-style-type: none"> - Significantly reduce the use of raw materials through recycling. - To admit the finiteness of resources by rationalizing the modes of supply. - Reduce social and environmental externalities related to the exploitation of Natural Resources. 	Sustainable supply
	Manufacture parts and assemble components and products	<ul style="list-style-type: none"> - From the design of a product, take into account his entire life cycle by minimizing negative impacts on the environment. - Reduce the production of industrial waste thanks to reuse and/or recycling. - Encourage producers to take account of the environment when designing their products. - Reduce the quantities of virgin materials and non-renewable energy used. 	<ul style="list-style-type: none"> -Ecoconception -Industrial Ecology
	Distribute	Use environmentally friendly means of transport	<ul style="list-style-type: none"> -Service economy: -Repair -Reuse
	Use	<ul style="list-style-type: none"> - A sober and responsible consumption. - sell services rather than products - lengthening the duration of use 	
Throw waste		Limit the generation of waste from the source. Waste represents an opportunity, it is now raw materials: hence the loop, the circular economy.	3R principle: reduction, reuse and recycling

Corporate responsibility

Companies through their activities affect the oceans, the soil, the climate and the life of society. With the realization of the danger that the linear economy represents for the environment, the behaviour and the responsibility of the companies are paramount as they play a leading role in the creation, the sale and the promotion of the goods and services. Through intense economic activities: industry, agriculture, construction, mining, energy production, supply of various services, companies annually produce millions of tons of waste and emit greenhouse gases.

For example, taking data provided by the European Union (EU) on the total production of waste generated by all economic activities and households. Out of a total of 2,538 million tonnes of waste, the construction sector contributed 36.4% followed by extractive industries (25.3%), manufacturing industry (10.3%), waste management services. waste and water (10%), households 8.5%. The remaining 9.5% is waste produced by other economic activities.

Faced with the challenges of our century with in particular the SDGs and the CE model, companies must review their practices by adopting those that take into account ecology and sustainable investment in respect of rights and human dignity because all economic activity aims at the 'well-being' of individuals. The EC through its pillar of sustainable supply ensures that workers exercise their profession in decent hygienic and safe conditions.

Among the pillars of the circular economy seen above, some are more the responsibility of companies or economic actors, these are sustainable sourcing, eco-design of products and processes, industrial and territorial ecology. , the functional or service economy, but also recycling which concerns consumers too. From the above, we believe that companies need to improve and comply with the challenges of social impact investing which lies in simultaneously generating financial return and social impact.

While taking into account the principles for responsible investment (PIR) which are a living commitment to encourage the taking into account of extra-financial aspects (environmental, social and governmental aspect) by all financial businesses (investments); we propose in a table some criteria of IRIS + (Impact Reporting Investment) set up by GIIN (Global Impact Investing network) having a relationship with the economy of the environment and resources. We show the correspondence between these practices (criteria) and the pillars of the CE as well as the objectives of sustainable development. Thanks to IRIS +, companies can assess and communicate their performance using agreed standards. (Table 2)

Table2

IRIS-CE-SDGs (Source: Compiled by the authors)

IRIS + criteria or environmental activities of the company	Pillars of the CE	SDGs*
<ul style="list-style-type: none"> - Materials used by weight or by volume - % of materials from recycled materials - Quantity of biodegradable materials used 	<ul style="list-style-type: none"> -Sustainable supply -Recycling 	6,8,9,11,12
<ul style="list-style-type: none"> - Use of pesticides - strategy on greenhouse gas emissions 	<ul style="list-style-type: none"> -Sustainable supply -Ecoconception -Industrial and territorial ecology 	3,6,8,9,12,13,15
<ul style="list-style-type: none"> - Energy produced for use (non-renewable or renewable) - energy conservation strategy - conserved energy -Initiatives to reduce indirect energy consumption and reductions achieved 	<ul style="list-style-type: none"> -Reduction -Reuse -Sustainable supply - Industrial and territorial ecology 	6,8,9,11,12
<ul style="list-style-type: none"> - Water consumed: total, recycled - compliance with wastewater treatment - % and the volume of recycled water and its quantity used -Quantity of water retained 	<ul style="list-style-type: none"> - 3R: reduction, reuse, recycling - Sustainable supply - Industrial and territorial ecology - Ecoconception 	6,8,9,11,12
<ul style="list-style-type: none"> - Waste generated - Waste disposed of; recycled, reused, landfilled, incinerated, composted, revalued - Efforts to reduce waste 	<ul style="list-style-type: none"> -3R: reduction, reuse, recycling - Industrial and territorial ecology - Lengthening the duration of use -Service economy 	6,8,9,11,12

**The 17 sustainable development goals (SDGs)*

1. No poverty
2. Zero hunger
3. Good health and well-being

4. *Quality education*
5. *Gender equality*
6. *Clean water and sanitation*
7. *Affordable and clean energy*
8. *Decent work and economic growth*
9. *Industry, innovation and infrastructure*
10. *Reduced inequality*
11. *Sustainable cities and communities*
12. *Responsible consumption and production*
13. *Climate action*
14. *Life below water*
15. *Life on land*
16. *Peace and justice strong institutions*
17. *Partnerships to achieve the goal*

Conclusion

It is essential to move from a linear economy which is based on the assumption that resources are inexhaustible because the future growth of the world population, with in particular the growth of the middle classes, could lead to an increase in the demand for resources. Natural. The circular economy is proving to be a solution to limit the damage caused by human activities on the environment. Companies are therefore called upon to better manage their waste and to seize the technological and industrial opportunities of the 21st century: to produce better, more sustainably while using fewer resources. Thanks to the IRIS criteria for assessing the social and environmental impacts of a good investment, companies are called upon to play an important role in favour of the economy of natural resources and the environment through initiatives aimed at exploiting them rationally for sustainable economic development and growth. With the recycling, reuse and recovery of waste as well as the functional economy, EC offers more than ever possibilities that can help achieve goals like zero waste, zero emissions, green growth, as well as the SDGs. . . . With the pillars of the CE, the responsibility of companies, consumers and governments, the circular economy practiced in all stages of the life cycle of all products, is presented as the conciliator that comes to slow the impact negative that economic activities always have on the environment.

1. Assemblée générale de l'ONU : Transformer notre monde : le Programme de développement durable à l'horizon 2030, 2015
2. Brundtland Commission, United Nations. (1987). Report of the World Commission on Environment and Development: Our Common Future. United Nations.
3. Christian Arnsperger et Dominique Bourg. Vers une économie authentiquement circulaire : Réflexions sur les fondements d'un indicateur de circularité, « Revue de l'OFCE 2016/1 N° 145 | pages 91 à 125
4. D. Bonet, I. Petit, F. Lancini l'économie circulaire : quelles mesures de la performance économique, environnementale et sociale ?, revue française de gestion industrielle, vol 33, N°4. 2014
5. Ellen MacArthur Foundation. (2014). Towards the Circular Economy: Acceleration the scale-up across global supply chains.
6. J.T. (Jesse) Rudolphi. Blockchain for a circular economy: Explorative research towards the possibilities for blockchain technology to enhance the implementation of material passports, Master thesis,
7. Mark W. Rosegrant, Ximing Cai, and Sarah A.Cline, l'eau et l'alimentation d'ici 2025 : politiques pouvant éloigner la menace de pénurie
8. Rapport de la conférence des nations unies sur l'environnement Stockholm, 5-16 juin 1972 IRIS taxonomy: IRIS Version 5.1, may 2020
9. V. Auzet et L. Georgeault Economie circulaire ; système économique et finitude des ressources, de Boeck supérieur S.A. 2019