CIRCULAR ECONOMY KNOWLEDGE

___Index___

CIRCULAR ECONOMY KNOWLEDGE

Introduction

Objects accompany our lives: we buy and use hundreds of products. Just think, for example, of the containers, like boxes, jars and bottles, which contain the food we buy at supermarkets; of the paper, pens, pencils and erasers we use at school or in the office every day; of the furniture in our homes and the objects and clothes that are stored in this furniture. We could continue the list, the result would be very long.

Comparing two models

Let's think now about how long the objects we use every day last: most of them have a very short life, we use them and then we throw them away. This happens, for example, with the packaging that contains food or products bought at the supermarket. Boxes containing toothpaste tubes or a toothbrush are immediately thrown away; the same goes for the cardboard that wraps fruit juices, the plastic packages enclosing many vegetables or fruits, and so on. What then happens to the tube of toothpaste when it's finished and to the toothbrush when it's worn out? We simply throw them away because they are no longer useful to us. The same applies to all the objects that are part of our lives: when we feel that they are no longer useful, we throw these objects away, turning them into waste.

This way of dealing with consumer goods has been called the "linear economy". According to this model of production and consumption, the life of each product is essentially marked by five stages: extraction, production, distribution, consumption and disposal. This means that industry extracts virgin raw materials, transforms them to produce consumer goods using labour and energy, distributes the products to the consumer who, after using them, discards what he no longer needs, that is the products themselves, which have now become "waste". Each stage of a product's life requires raw materials and energy and generates waste and polluting emissions.

According to this model of economy, every item of consumer goods goes from the cradle to the grave: this means that products have a beginning and an end, in fact, their life ends in the dustbin, where the material becomes waste, unusable for production purposes. It is now globally acknowledged that this use of resources, combined with steady population growth, increasing consumption and often inefficient use of resources, is no longer sustainable. If this trend continues at the current rate, we will find ourselves needing two planets by 2050.

Planned obsolescence

We talk of "planned obsolescence" to define the strategy adopted by the industrial economy, according to which the duration of consumer goods is limited to a preset period. After that time, the product becomes unserviceable or simply obsolete in the eyes of the consumer in comparison to new models on the market, which appear more modern although they are little or no better from a functional point of view. Planned obsolescence came into being with modern industrialism and the era of mass production of consumer goods, thus at the turn of the 20th century. At first,

industrial production relied on quality to leverage the market, so robust materials were used, there was good manufacturing and optimal design. However, this did not last long: already in the early 1920s, it was realised that the products "lasted too long" and that this slowed down production at a time when factories were able to produce more and more objects, reducing the amount of human labour. Thus, owning a durable item was the main obstacle to growth of sales. Consequently, in 1924, light bulb manufacturers created the Phobos Cartel which, together with the standardisation of fittings, wattage and brightness, set the "ideal" duration of light bulbs – for companies, certainly not for consumers – at 1,000 hours, when it was already easy to produce bulbs that would last 2,500. The term "planned obsolescence" first appeared in literature in 1932, when real estate broker Bernard London proposed that it should be imposed on businesses by law so they could boost consumption in the United States during the Great Depression. It was thus that the consumer and throw-away society came about, disregarding the fact that, while the objects we use every day have a short life cycle, the materials from which they are made last much longer, to the point of being a permanent problem.

In the 1930s, when researchers at the chemical company DuPont succeeded in creating nylon, a very strong new synthetic fibre, it was used to make women's stockings that were much more unlikely to ladder than the existing ones. Since the durability of the stockings was excessive and detrimental to business, DuPont instructed their technicians to make the fibre they had created weaker.

Development of the linear economy

At the turn of the 20th century, mankind experienced a period of rapid economic and scientific growth. The incredible technological development that followed the Industrial Revolution and, above all, the post-World War II period, led to a rapid increase in wealth and, as a result, gave rise to and nurtured the idea of an infinite availability of resources, materials and products. This illusion of infinite resources has been both the cause and effect of development of the linear economy. The economic boom and the emergence of the "consumer society" have contributed to an acceleration of production processes and consequently to a reduction in the duration of product lives.

We convince ourselves that the economic system can satisfy every need, that everything the market asks for can be produced by adjusting production to demand (according to a model that pursues infinite growth). The common thinking was that the environmental system was capable of generating all the natural resources that served as inputs to the economic system. This way of producing and consuming would only work if planet Earth were infinite, with infinite resources and infinite energy at our disposal. We are well aware, however, that the resources our planet can offer us are limited, finite and exhaustible, especially at the rate at which we extract and use them today. It is therefore clear that a development model that envisages unlimited growth in consumption is in contrast to the concept of sustainability. For this reason, the linear economic model began to lose popularity in the second half of the twentieth century, precisely with the emergence of energy crises and pollution on a global scale. The emergence of environmental problems and limits to available

resources (energy and raw materials) are forcing the scientific community to re-evaluate the relationship between the economy and the environment, in favour of more sustainable models.

Limitations of the linear production and consumption model

As we have seen, the linear economic model is based on the continuous consumption of objects: for example, a smartphone that is still perfectly functional has to be changed only because a new model has come out; a broken vacuum cleaner is replaced with a new one because doing so costs less than repairing it. So the raw materials extracted and processed to obtain the 'old' smartphone or the broken vacuum cleaner become waste. In the linear model, resource management is organised into open throughputs, which take the raw material from its natural location to landfills. Multiple and expensive extraction, refining and processing activities have no other purpose than to create a product that will remain in our possession for a short time and then be thrown away.
The main critical issues related to the linear economy regard:

- growing demand for raw materials and energy: the linear economy considers the resources on our planet to be unlimited and therefore uses processes characterised by open throughputs of energy and materials;
- pollution resulting from the production of new products and the disposal of old products, which have become waste: along the five stages of the linear production process, manufacturing waste, waste water, greenhouse gases and waste are generated, all of which have profound environmental impacts on water, soil and air.

What is circular economy

It is difficult to trace the concept of the circular economy back to a certain date or a single author. However, practical applications to modern economic systems and industrial processes date back to the 1970s. Certainly one of the essays that laid the foundations of environmental economics is **"The Economics of the Coming Spaceship Earth"**, published in 1966 by Kenneth Boulding. In the essay, Boulding outlines two types of economy, identifying them with two figures, the cowboy and the spaceman: the cowboy merely considers the endless plains that surround him, driven by a continuous thirst for conquest and consumption; the spaceman, on the other hand, is profoundly aware of the system in which he lives, the great spaceship Earth, of its limits and the cycles that regulate its operation. "*For the sake of picturesqueness, I am tempted to call the open economy the "cowboy economy", the cowboy being symbolic of the illimitable plains and also associated with reckless, exploitative, romantic, and violent behaviour, which is characteristic of open societies. The closed economy of the future might similarly be called the "spaceman" economy, in which the earth has become a single spaceship, without unlimited reservoirs of anything, either for extraction or for pollution, and in which, therefore, man must find his place in a cyclical ecological system which is capable of continuous reproduction of material form even though it cannot escape having inputs of energy.*"
Boulding was the first to consider the Earth as a closed system: only from the Earth, just as spacemen

do in a spaceship, can Earthlings get the resources they need, and only on Earth can they discard waste and refuse. Energy stocks, therefore, can only be replaced by solar energy while water and raw materials can only be durable if they are reused and recycled. The myth of the expansion of consumption and the economies of individual countries and the world can only lead to a more or less rapidly approaching crisis, precisely because this model is based on a mistaken assumption, which is to consider the resources on our planet as unlimited.

The 1970s and environmental awareness

The 1970s marked the advent of environmental awareness, ecological thinking and the need to adopt a more sustainable economic and lifestyle model. In those years the environmental movement was born on an international scale and in 1972 MIT produced the "Limits to growth" scientific report commissioned by the Club of Rome, to study the problems of scarcity of resources and limits to development. A computer simulation was used to assess the consequences of population growth on ecosystems and nature reserves. The report was published at a time when the world's first major oil crisis was breaking out, so there was widespread concern and fear for the future. In that social context, the publication could not fail to mark a turning point in culture and collective awareness. The idea that we had to come to terms with the finite supply of natural resources and the unsustainability of an economic model based on unlimited growth with a model of economic and ecological stability began to be perceived.

The report scientifically demonstrated the existence of an insurmountable limit to economic development due precisely to the limitedness of natural resources. The scenario envisaged by the study was far from rosy: economic development and population growth would come to a halt as resources were depleted, and humans would gradually lose the benefits they had gained up to that point. In order to avoid limits to development, the authors of the report proposed the adoption of sustainable development, i.e. an energy and economic policy based on natural resources and sustainable limits to exploitation. In this way, the planet would continue to benefit from steady economic growth without suffering the risk of resource depletion.

The closing circle and the limits of development

In 1971 Barry Commoner, an American biologist born in 1917, wrote in the well-known book "The Closing Circle": "*The Earth's life system derived from the consumption of a non-renewable resource, on water and on the geochemical store of organic matter (…) survival became possible because of a timely evolutionary development: the emergence of the first photosynthetic organisms (…). These new organisms used sunlight to convert carbon dioxide and inorganic materials into fresh organic matter. This crucial event reconverted the first life-form's waste, carbon dioxide, into its food, organic compounds. It closed the loop and transformed what was a fatally linear process into a circular, self-perpetuating one.*" The book was written in a particular historical moment – as we have seen in the previous paragraph, interest in ecology was rapidly growing.

In April 1970, Earth Day was established, the Council of Europe proclaimed 1970 "European Year of Nature Conservation" and the United Nations organised a major world conference in June 1972

(Declaration of the United Nations Conference on the Human Development – Stockholm, 16 June 1972). Following the Stockholm Conference, UNEP was established and, together with UNDP, FAO, UNESCO and IUCN, it is one of the most important references for sustainable development worldwide. The United Nations Conference resulted in the Declaration on the Human Environment, a document that states 26 principles on the relationship between social well-being and protection of environmental heritage, according to a criterion of fair distribution of resources, including future generations. The document states that Economic Development Plans should take particular account of this relationship and encourage the adoption of coordinated and integrated measures.
Returning to Commoner, it must be pointed out that the concept of closing the circle became immediately clear from a scientific and ecological point of view, but its correlation with the economic sphere was not immediately understood.
An interesting fact: do you know when ecology was born? Well before the 1970s. More precisely, the word ecology was coined in 1866 by the German biologist Ernst Haeckel (1834-1919) who, in publicising Darwin's discoveries, had suggested the need for an independent discipline aimed at describing the influence that the environment exerts on living beings. This discipline was intended to describe both exchanges of matter and energy between living beings and the atmosphere, water, sea, soil, and living beings' exchanges among themselves, united by food chains and networks. It is not surprising that Haeckel defined ecology as the "economy of nature".

Stahel's Circular Economy

Walter R. Stahel is today considered the father of the circular economy and one of the greatest visionaries because he firmly believes that another economy is possible. In 1976, together with Geneviéve Reday-Mulvey, Stahel produced a technical report for the European Commission entitled 'The Potential for Substituting Manpower for Energy', in which he analysed the issue of resource wastage related to the rapid disposal of consumer goods. That report, which a few years later became a book - 'Jobs for Tomorrow - The Potential for Substituting Manpower for Energy' - was the first to offer a description of a new economic model that differed from the linear economy: the circular economy. What emerged in that report was that ¾ of the industry's energy consumption was associated with the extraction and production of raw materials, while only 1/3 was used in actual production processes. According to the authors, therefore, by reusing products instead of manufacturing new ones, labour would replace energy consumption, leading to energy savings and the creation of new jobs. Stahel stated that: "applying the principles of the circular economy to manufacturing will enable the private sector to create jobs locally, reduce consumption, greenhouse gas costs and of course waste. But the transition from a linear to a circular industrial economy will entail radical structural transformations: it will involve transition from a global to a regional economy, transition from linear to circular production, optimisation of the entire manufacturing process and maximisation of product utilisation."

Cradle to Cradle

"All the ants on this planet together create a biomass far greater than that of we humans. Ants have been incredibly industrious for millions of years, yet their productivity has nourished plants, animals, and soil. The same cannot be said of human industry. Human industry has been in business for just over a century, but it has caused the degradation of nearly every ecosystem on the planet. Nature does not have a design problem. Humanity does." ("Cradle to Cradle, Remaking the Way We Make Things.", Michael Braungart, William McDonough).

In 2002, the American architect William McDonough and the German chemist Michael Braungart published the book "*Cradle to Cradle*, *Remaking the Way We Make Things*", in which they illustrate how it is possible to create a human society totally free of waste, emulating the balance existing in natural ecosystems, thus reconciling environmental protection, social equity and development. *"Eliminating the concept of waste, not by reducing, minimising or avoiding waste, but by eliminating the concept itself by design"* is their motto. Objects, therefore, are designed by them to be everlasting and to be either reintroduced into the production cycle as raw material or perfectly reintegrated into the natural cycle. The production cycle thus becomes a closed circle like that of nature: nothing is created, nothing is destroyed, everything is transformed.

The cradle-to-cradle approach contrasts with the existing industrial system, based on the cradle-to-grave paradigm, according to which the consumer goods we produce and use are destined to end up in landfills or incinerators, resulting in a waste of valuable materials, resources and energy and production of pollutants. This situation is exacerbated by the fact that many items of consumer goods have an inherent "sell-by date", i.e. they are designed with a limited shelf life, with the aim of encouraging consumers to make new purchases.

From sailing to the circular economy: Ellen MacArthur's story

In 2010, Ellen MacArthur founded the Ellen MacArthur Foundation, an international non-profit organisation established to accelerate transition to a regenerative and circular economy and to make it an effective reality. At present, the Ellen MacArthur Foundation is the main operational body for the dissemination of the circular economy internationally, as it works to bring together even complementary schools of thought with the aim of creating a coherent framework.

Before devoting herself to the Foundation, Ellen MacArthur was a yachtswoman for several years, also achieving a number of successes in international regattas. In 2001, at the age of just 24, she came second in the Vendée Globe solo sailing race, the youngest competitor ever to complete the voyage, and was subsequently appointed as a Member of the Order of the British Empire (MBE) for services to sport. In 2003, she captained a record attempt at a round-the-world race aboard a catamaran, but unfortunately this attempt failed because of a broken mast.

At a certain point, still quite young, she abandoned her career in sailing despite being at the height of her success, in order to apply what sailing had taught her to the world of economics. "Suddenly I connected the dots," she says, referring to the fact that a finite amount of products, from food to energy, have to be precisely managed on a boat, "our global economy is no different. It's entirely dependent on finite materials we only have once. It was a bit like seeing something you weren't

expecting under a stone and having two choices: I either put that stone to one side and learn more about it, or I put that stone back and I carry on my dream job of sailing around the world. I chose the first. I put it to one side and I began a new journey of learning, speaking to chief executives, experts, scientists, economists, to try to understand just how our global economy works. And my curiosity took me to some extraordinary places."

"And I realised that we've been perfecting what's effectively a linear economy for 150 years, where we take a material out of the ground, we make something out of it and then ultimately that product gets thrown away, and yes, we do recycle some of it, but it's more of an attempt to get out what we can at the end, not by design. It's an economy that fundamentally can't run in the long term, and if we know we have finite materials, why would we build an economy that effectively uses things up, that would create waste? Life itself has existed for billions of years and has continually adapted to use materials effectively. It's a complex system, but within it, there is no waste. Everything is metabolised. It’s not a linear economy at all, but circular."

Text updated to August 2022