CIRCULAR ECONOMY- A POSSIBILITY FOR A SUSTAINABLE ECONOMIC DEVELOPMENT

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Abstract

As mentioned in the European official documents one of a main objective of European Sustainable Development is the way to an European Circular Economy aiming to an efficient resources allocation , diminish the environmental impact of toxic natural environment, creating new jobs through a innovative management through the relationships between public authorities, economic agents and universitary environment.

In this framework, circular economy is a concept as well as a development strategy, that takes into account the general triad principles of circularity, cascade effects and zero waste inspired by the heliocentric model of matter and waste transformation applied to the material, informational, managerial,knowledge educational and spiritual concrete forms of manifestation.

Keywords: circular economy, economic sustainability, learning to learn

JEL code: Q01, Q57, M21 D83

Nowadays, the competition between East and West more specific between China and European Union takes a specific form of so called strategic transition to a Circular Economy, as stated in the European Commission documents package or in the Circular Economy Law in the China legislation framework[98].

Circular Economy (CE) is in equal measure a theoretic concept and practical application but also invite to an spiritual noetic self-interrogation related to profit, knowledge and living issues that fuel in a sustainable way the interactions between natural environment, economy and society.

At a first sight, CE concept illustrates simple but important characteristics-circularity, cascade effect, and zero-waste ideal- inspired by the Heliocentric Biomimicry model, the way of how Planet Sun teach us: the Solar Light and Radiant Energy (as a center) is transformed into crops which in turn are transformed into biomass that can be refined into products. The residual waste resulting from this production process is feed back into the loop and is either used as compost to help grow crops, turned into food or animal feed, or used to supply the energy required by other steps in the entire process.

In this context, all natural resources are in way or other in a continuous process of a circle transformation because they are renewable but not exhaustible (wind, solar radiation, ocean and air),renewable but exhaustible (biodiversity, freshwater, etc.) or as simple resources which are exhaustible(fossil fuels and radioactive materials).

This process of circle transformation begins with a cradle to grave and ends with cradle to cradle. In this framework, at the beginning, cradle-to-grave approach aims to improve the environmental performance of products and to minimize environmental degradation throughout the product life cycle. The life cycle ranges from extraction of raw materials via processing, assembling, use to disposal of the product as waste. This approach could be represented by a linear model to take-make-consume-throw away and dispose. (figure 1).

Cradle-to-cradle concept goes one step further, envisioning cyclical material flows, where each material at the end of a life cycle becomes the raw material of another generation of products so

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[98] European Commission (2014) - "Scoping study to identify potential circular economy actions, priority sectors, material flows and value chains" Funded under DG Environment's Framework contract for economic analysis ENV.F.1/FRA/2010/0044, 2014 http://www.ieep.eu/assets/1410/Circular_economy_scoping_study_-_Final_report.pdf; Order of the President of the People's Republic of China no.4/2009, http://www.fdi.gov.cn/1800000121_39_597_0_7.html

the term waste would even become obsolete by enabling their perpetual flow within one of two metabolisms: the biological metabolism and the technical metabolism. (figure 2).

Fig.1. *The linear structure of the industrial economy (or 'river' economy).*

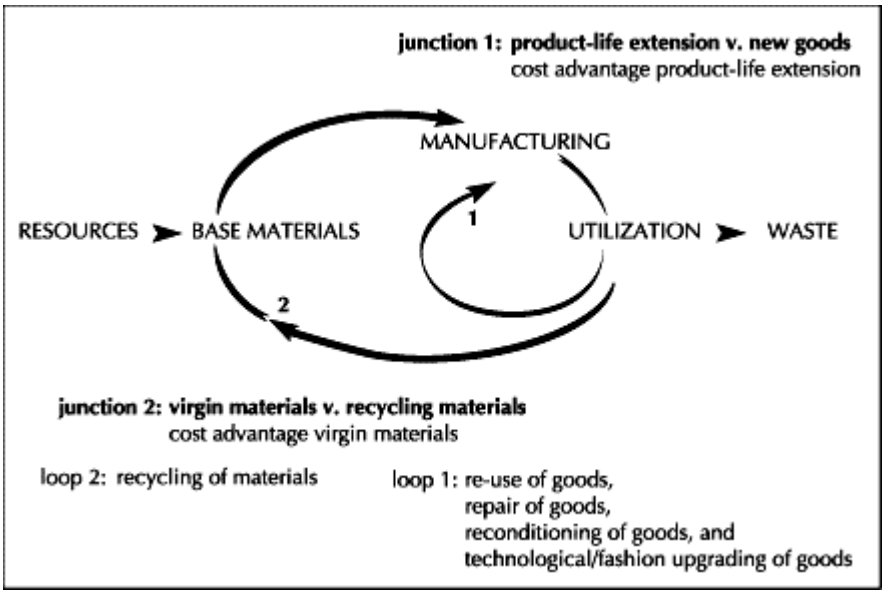

Fig.2. *Non linear Model of closing material loops:opened to a more sustainable service economy (or 'lake' economy)*

Source : Stahel, W., 1998. "From Products to Services: Selling Performance Instead of Goods", IPTS Report, Vol. 27., http://www.greeneconomics.net/Stahel%20Essay1.doc

From a theoretical perspective, CE is rooted in the sustainable development general framework related to weak and strong sustainability models (Steady State and Degrowth), but also inspired by other sources (the classical Kondratiev waves of long term economies evolution) to illustrate finally through a comparison between an extensive linear and an efficient-intensive non-linear approach of interaction between society, economy and natural environment, the importance of so called transition from cradle-to-grave economics to cradle-to-cradle spaceship economics with its 3R features(reduce, reuse, recycle).[99]

Then this CE cradle to cradle principle could be applied to the quantity, quality, structural and final utility analysis of different goods, services, business management skills, education & knowledge public finance strategies or noetic-spiritual self-interrogative issues that fuel in a sustainable way the interactions between natural environment, economy and society .

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[99] Giljum, Stefan and others(2006)- "New environmental concepts and technologies and their implications for shaping the future EU environmental policies" Final Report http://seri.at/wp-content/uploads/2010/06/environment-and-innovation_new-environmental-concepts-and-technologies-and-their-implications-for-shaping-the-future-EU-environmental-policies.pdf, Imura, Hidefumi (2013)- "Environmental Systems Studies: A Macroscope for Understanding and Operating Spaceship Earth", Springer Japan,2013; Charonis, George-Konstantinos (2012) - "DEgrowth, steady state economics and the circular economy: three distinct yet increasingly converging alternative discourses to economic growth for achieving environmental sustainability and social equity- http://sustainabilityconference2012.weaconferences.net/the-papers/ Roberto Bermejo (2014)-"Handbook for a Sustainable Economy", Springer Science+Business Media Dordrecht 2014, chap. 16: Circular Economy: Materials Scarcity, European Union Policy and Foundations of a Circular Economy pag.269-289

CE notion illustrates a new way of thinking based on the generous idea of sustainable investment in the 3R-to reduce, recycle, reuse-: in every apparent waste insignificant thing or living form you can find always something useful for future or raison d' être as in the case of the concept of learning to learn in the works of Joseph Stiglitz or in the sustainable open minded meaning of deep ecology mentioned by Arne Naess.

In the CE an important place have the analysis of nature and reason effect of waste on the supply chain and life cycle of raw materials, products, services, knowledge & education in a quantitative, qualitative, structural and final utility design analysis that implies a long life learning of what does really means an idealistic zero waste in a world of material transformation into information and conversely from information to materials.

In this framework CE illustrates some concrete interrelated possible forms of manifestation as in the case of material, informational, managerial, socio educational and spiritual perspectives.

From the material perspective, waste means to considerate the weak and strong sustainability characteristics:

- on one hand waste is as an externality effect on the economy in the form of a transition from "polluter principle" to a "pay as you throw" principle fact illustrated by the international experience of landfilling and municipal solid waste management to obtain from waste hydrogen and methane-the future fuels;

-on the other waste is an resilience based effect on economy supply chains in different forms (material, energetic, informational). In this framework, waste is a material entropic flow result of a multidisciplinary advanced industrial ecology management based on absolute and relative dematerialization within an eco-industrial park space characterized by industrial symbiosis and habitus socio- psychologic practices.

-the final goal of material perspective is to make a distinction between material circularity and product circularity: the former is related to the toxicity landfilling of solid municipal waste management as well as to extract hydrocarbons such as methane, the latter related to a more sustainable length and duration of product value chain design

Both of these aim to change the material composition of the product as well as to promote a "second hand" voluntary simplicity consumption pattern by reduction, substitution or reutilizing to make the product still useful in integral or partially.[100]

From the informational, managerial and educational perspective waste circularity means to considerate the following issues.

The informational perspective illustrates continues some of the material circularity issues in the way of consider the waste not only a problem of material experimental sciences but also a problem of conceptual eco innovative design thanks to the service sector activity.

In this context appears an incapacity of material circularity to manage the material flows on the market due to an oversupply of secondary resources generated by the second hand market loops.

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[100] R.E. Hester, UK R.M. Harrison editors (2013) - "Waste as a Resource" Issues, In Environmental Science and Technology nr. 37, RSC Publishing ,,The Royal Society of Chemistry 2013, He Pinjing, Lu¨ Fan, Zhang Hua and Shao Liming " Recent Developments in the Area of Waste as a Resource, with Particular Reference to the Circular Economy as a Guiding Principle" pag.144-161;
Jochem Zwier,Vincent Blok ,Pieter Lemmens, Robert-Jan Geerts - "The Ideal of a Zero-Waste Humanity: Philosophical Reflections on the Demand for a Bio-Based Economy", Journal of Agricultural and Environmental Ethics April 2015, Volume 28, Issue 2,pag. 353-374
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Michael von Hauff, Ralf Isenmann ,Georg Müller-Christ(2012) - "Industrial Ecology Management - Nachhaltige Entwicklung durch Unternehmensverbünde" Springer Gabler, 2012
Ernst Worrell And Markus A. Reuter()-"Handbook Of Recycling- State-Of-The-Art For Practitioners, Analysts, and Scientists" Elsevier 2014, ch. 30 "Squaring the Circular Economy: The Role of Recycling within a Hierarchy of Material Management Strategies", author Julian M. Allwood pag. 445-479 and chapter 31 "The Economics of Recycling", authors Pieter Van Beukering, Onno Kuik, Frans Oosterhuis pag 479-488

From this perspective, material circularity is a necessary but not a sufficient condition for a circular economy because service industry generate a new characteristic of circularity applied to specific wastes in the supply chain product (physical, energy, informational).

As mentioned some researchers such as Walter R. Stahel(1998) or recently Renu Agarwal and others(2015) the service economy system play an important role in the circular economy as an integrated system "to create the highest possible utilization value for the longest possible period of time while consuming as few material resources and as little energy as possible".

In this respect, the service informational circularity minimize the generated waste conditions (the overproduction situations, lost opportunities related to eco-innovations, or in other marketing activities that affect a proper dissemination of information to the consumer).All of these conduct to the importance to imagine and conceptualize a new product matrix based on the actual one features within a process of social and technological learning .

In the managerial perspective, as stated by some researchers like Bas Mentink(2014) or Susana Garrido Azevedo and others(2014),CE means to take into account a new eco-innovative business model.

The starting point is the fact that eco-innovation is the way from idea to the market success related to new goods, services, organizational change or marketing solutions that reduces the use of natural resources(including materials, energy, water, and land) and decreases the release of harmful substances across the whole life-cycle.

From this perspective, the managerial circularity is interested to transform the linear threats of material and informational wastes into circular opportunities, to generate more confidence between firm stable or interested stakeholders, to improve the external image and gain legitimacy in the market place as well as to contribute to modernization of legal framework and political climate related to a transparent lobbying.[101]

In this framework eco innovation creates multiple circles that need to take care on a specific non linear managerial circularity model to diminish and reevaluate the the specific managerial wastes generated by the redundancies in management thinking by using for example the SIX sigma or TRIZ algorithms in solving problems.

The former is a statistic analysis of information portfolio structure externalities and the latter – named as theory of inventive problem solving- is interested in a syntetic formulation of problems, searching the analogies between internal stake holders and finally to resolve the problem with the help of so called external information brokers (highly specialized actors-university teachers, research institutes, consultant companies or other interested companies acting on the supply chain).

[101] Bas Mentink (2014)-" Circular Business Model Innovation -A process framework and a tool for business model innovation in a circular economy", Master thesis of Science in Industrial Ecology & Leiden University, http://repository.tudelft.nl/view/ir/uuid%3Ac2554c91-8aaf-4fdd-91b7-4ca08e8ea621/
Susana Garrido Azevedo, Marcus Brandenburg ,Helena Carvalho Virgílio Cruz-Machado (2014)-"Eco-Innovation and the Development of Business Models - Lessons from Experience and New Frontiers in Theory and Practice, Greening of Industry Networks Studies Vol.2, Springer International Publishing Switzerland 2014, chapter 2 "Managing Cross-Industry Innovations: A Search Strategy for Radical Eco-innovations" authors Michaela Kloiber and Reinhold Priewasser, pag. 19-39, chapter 5 "Radical and Systematic Eco-innovation with TRIZ Methodology", author Helena V.G. Navas, pag 81-99

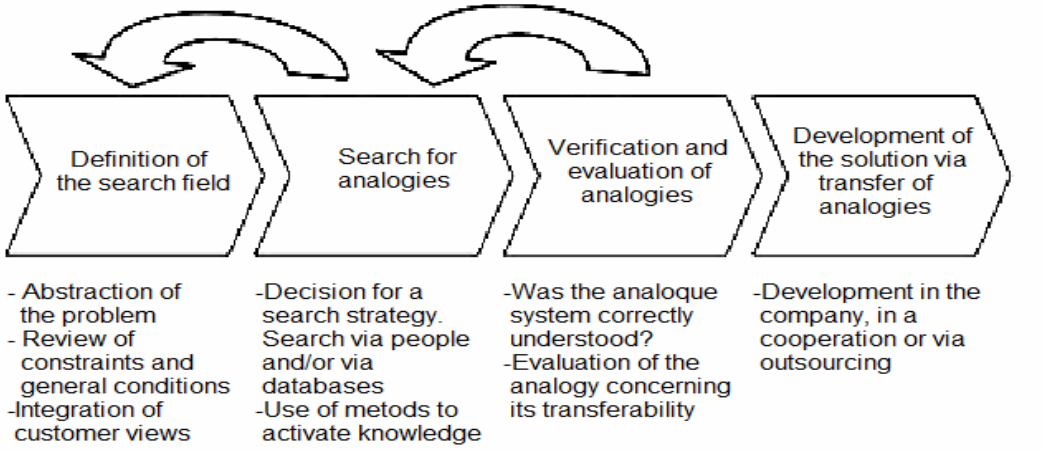

Fig.3. *Process model of using analogies in product development*

Source : Susana Garrido Azevedo and others (2014), page 26

The socio educational perspective illustrate the CE as an important factor in construction of a knowledge society based on human capital development. That means to take into account two possible of educational circularity models related to weak and strong sustainability characteristics.

On one hand is about the so called classic Triple Helix model mentioned by Henry Etzkowitz (2008) or environmental habitus concept invented by the sociologist P. Bourdieu .

These models are based on an interdisciplinary, multidisciplinary, and complementary relationship between public authorities, economic agents and academic environment in the present this models includes also the consumer, civil society and mass media culture.[102]

On the other hand ,the educational circularity illustrate importance of positive externalities from learning for individuals and society in a learning to learn process of continuous development of personal endowments abilities to transform ideas into knowledge as stated the works of Joseph Stiglitz[103].

In this framework is important to take into account the relations between the object of learning (to became conscientious about the importance of personal endowment ability to transform inputs into outputs) and the process of learning to learn(learning for the future or by learning to learn by learning from others, from trade, using the technology and social sciences instruments) to create in final a learning architecture of learning principles, instruments and values system that create new space of market competition and better relations between people based on rule of law , economic rationality and emotional intelligence.

The last but not the least the spiritual perspective of CE illustrate the importance of creating the possibility of something new taking into account the necessity to integrate the philosophical methods of wishful truthful path approach, synthetic, analytic methods in the real and ideatic worlds.

In the same time it is to consider a deep ecology noetics that opens a new horizon of transforming the individual defined in the economic, psychologic ,sociologic ways into a conscious person that manage a circular logical time of issues of the fact that it is not a simple homo oeconomicus or zoon politikon that comes from nowhere and goes to nowhere but a person creation prototype of a

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[102] Henry Etzkowitz (2008) - "The Triple Helix: University-Industry-Government Innovation in Action" Routledge, 2008; Loet Leydesdorff (2011) The Triple Helix, Quadruple Helix, and an N-tuple of Helices: Explanatory Models for Analyzing the Knowledge-based Economy? http://www.leydesdorff.net/ntuple/
Justin Karol and Trevor Gale() - "Bourdieu's Social Theory and Sustainability: What is 'Environmental Capital'?" http://www.aare.edu.au/data/publications/2004/kar041081.pdf

[103] Joseph E. Stiglitz and Bruce C. Greenwald (2014) - "Creating a Learning Society - A New Approach to Growth, Development, and Social Progress", Columbia University Press New York,

Trinitarian Loving God that makes the world from nothing (creatio ex nihilo) and make possible by His humility sacrifice for human being to deepen in his rationality and sensible features [104]

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