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## **INCLUSIVE CIRCULAR ECONOMY: AN APPROACH FOR EMERGING ECONOMIES**

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### **ABSTRACT**

Circular Economy-CE is a systemic change that builds resilience in the long term and creates business opportunities and innovative solutions for the economy, providing environmental and social improvements. However, CE guidelines do not include how to deal with the systemic design of 'circular relations' involving the low-income population as promoters and actors of sustainable development, imperative in emerging economies such as Brazil. This article investigates the lack of theoretical and practical structures, in the convergence between CE and design, which may guide the design of circular, systemic relations for socio-ethical development, proposing a bibliographic review of the CE concepts and guidelines, along with a brief evolutionary description of the approaches of Design for sustainability. Finally, present Brazilian case studies to discuss the power of organized vernacular actions for the inclusion and social development of the marginalized members of society, favoring socioeconomic development in an ethical and equitable way of needy communities within CE systems.

Key Words: Circular Economy, Systemic Design, Social Development, Emerging Economies

## 1. FROM LINEAR SYSTEMS TO CIRCULAR ECONOMY

Since the advent of the Industrial Revolution, the world has adopted as a model of progress based on the idea of Linear Economy (LE), where mass produced products follow the logic of ‘make-take--dispose’ (Blomsma & Brennan, 2013). LE is a centralized production system that uses a large amount of resources and energy and is not directly involved with the issues of the territory, culture and identity of the places where its operation takes place (Ellen Mac-Arthur Foundation, 2013).

In general terms, LE is based on a model that does not effectively rationalize the extraction of natural resources, does not predict its efficient use in the industries, or its reuse in consecutive production processes. It also does not aim at the intelligent use of non-polluting energy matrices and from renewable sources and the efficiency of transportation systems in all its stages (Ibidem). Similarly, the outputs of a Linear Economy system are not based on the life cycle analysis, and do not define the end of the useful life of artifacts (Manzini & Vezzoli, 2002).

The results of this practice are the rapid degradation of the environment and its natural systems, the constant tearing of the limits of resilience of nature, and the extinction of non-renewable resources and the accumulation of solid waste, pre and post-use. According to Rifkin (2012), these results are equivalent to the entropy of the planet and its systemic effects have disastrous and irreversible consequences in the short, medium and long term, for nature, economy and society (Lewis & Gertsakis, 2001). However, in recent years, the concept of Circular Economy (CE) emerged as an alternative to the LE. This relatively new paradigm embraces the idea of systemic thinking, and considers the complex relationship between choices and results, offering guidance to make products more effective and efficient in all dimensions of sustainability. According to Blomsma and Brennan (2017, p. 603), CE can be considered an umbrella concept whose roots are in the schools of thought of Regenerative Design, Performance Economics, Cradle to Cradle, Industrial Ecology, Biomimicry and Blue Economy (Ellen Mac-Arthur Foundations, 2013, 2018). These pillars make the CE a model more consistent with the present and future needs of the planet and a strong instrument to reduce its entropy.

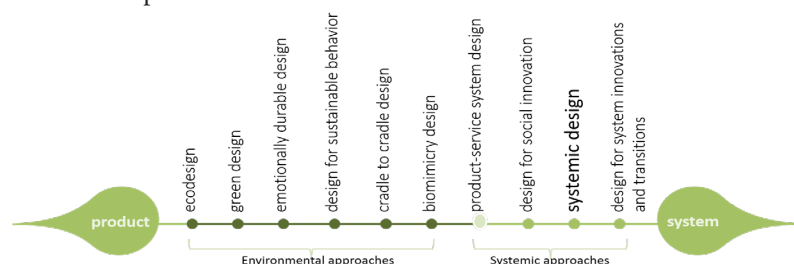
Inspired by the efficiency of the natural systems and considering the interventions of human activities, CE proposes as principles: eliminating waste and pollution; Maintaining products and materials in constant cycles of use; Regenerating natural systems. These principles concentrate, firstly, on dematerializing production whenever possible, mitigating the entropy caused by the intervention of human activities in the natural system, diluting the use of the energy used in the transformations of the raw material and use of products and using materials -natural and artificial- in subsequent cycles (Ellen Mac-Arthur Foundation, 2013, 2018). Circular Economy considers two types of material cycles: biological and technical cycles. The former refers to the reintegration of materials into the biosphere/natural processes, once the products arrive at the end of its life cycle, while technical cycles re-introduce material into other production systems (Bompan, 2017, p. 18).

The emerging new sustainable approaches such as CE, fostered methodological change in design towards a new methodological approach. Instead of focusing on the development of “better” more sustainable products, the design discipline envisioned new forms to attend human needs through the development of less material intensive solutions. In this way, in a short period of time, the design discipline evolved from environmental approaches, focused on product development and eco efficiency, towards a more systemic understanding of human needs, envisioning a more comprehensive, sustainable way to deal with the problems, fostering innovation and less dependency from the linear economy rationale. That evolution is described in the next section.

## 2. FROM ENVIRONMENTAL APPROACHES TO SYSTEMIC APPROACHES IN DESIGN

Faced with complexity and assuming its strategic role in the transition to sustainable ways of life, the design discipline has developed systemic approaches with new theoretical and multidisciplinary contributions in the last 3 decades. Ceschin and Gaziulusoy (2016) elicit some of these design approaches to sustainability, (Figure 1).

As shown in Figure 1, Ceschin and Gaziulusoy (2016) point to a transition to sustainability where, instead of focussing on environmental approaches for product development, there is a shift towards complex systemic approaches in which the use of environmentally friendly materials and processes, clean technologies and sustainable methodologies only make sense for sustainability if designers “pay full attention to the essential relationships and critical connections between systems” (Nelson & Stolerman, 2012, P. 57). According to the authors, designers should be able identify and protect the essential connections found in life, so that systemic thinking can be applied to design projects and the macro systems in which such projects are incorporated.



[Figure 1] Systemic evolution of design approaches (Font: Author)

In their historical review, Ceschin and Gaziulusoy (2016) show that, at first, the methodologies of design for sustainability were essentially concentrated on the environmental requirements of products, developing methodologies, tools and instruments for the design of intrinsically sustainable physical artifacts. This view proved to be insufficient and demanded for a new direction towards the dematerialization of production and consumption in order to reach sustainability. Instead of environmental approaches focused on products, this new vision favored the development of systemic approaches such as Product-Service System-PSS, where the union of product with services associated to it enabled the satisfaction of human needs. (Manzini & Vezzoli & Clark, 2001; UNEP, 2002; Mont, 2002; Manzini & Vezzoli, 2002; Vezzoli, 2010; Ceschin, 2016)

From the moment society shifts towards systemic approaches, it changes the role of users from spectator with the power of choice, to main actors. In this new paradigm, people abdicate from ways of life and consumption with individualistic habits centered in the possession of material things, to collective attitudes centred on being (Manzini, 2003). This approach radically subverts the historical role of design, which passes from designer of products to developer of systemic solutions, paving the way for the emergence of approaches, such as design for social innovation, systemic design and the design of systems for transition and innovation.

It is currently understood that all the choices drawn by design with objectives of promoting sustainable development are only possible with the active participation of all social actors, without exception and in a systemic way. Therefore, basic actions such as the recycling of materials, are only effectively possible if there is a systemic planning that counts on the participation of social actors. For instance, while recyclability is a property of the material and the reuse is a property of the product, circularity is an attribute of the system. When it comes to a physical product, all its sustainable properties and in particular, those related to the end of the life cycle, remain latent until activated by the actors of the system. However, taking as guidance the heuristic and guidelines of the circular economy, there is no allusion in the bibliography to the role (s) exercised by society in the systemic organization required by sustainable scenarios and this is one of the weaknesses of the circular economy. According to the United Nations, “While the Circular Economy takes into account only the environmental and economic pillars of sustainability, it risks leaving out an essential third pillar: inclusion (Social), cutting down the poorest countries of the global supply chains” (UNIDO, 2018, p. 6).

### 3. CIRCULAR ECONOMY IN EMERGING ECONOMY CONTEXTS.

In emerging economies, there are many examples of circular economy programs, especially in the recycling of solid waste. In Brazil, for instance, The National Council of Industries-CNI (2018), e.g., maintains an integrated system of waste stock, which allows the negotiation of these as raw material within the industrial circuit itself.

However, in emerging economies, the concept of a circular economy transcends the industrial perimeter and moves to other layers of society, especially the ones located at the base of the pyramid. Cases of ‘inclusive’ circular economy spontaneously emerge among marginalized population which, finds in the search, selection, and recycling of industrial residues, its main source of income (Figure 2).



[Figure 2]: Scavengers as part of the social cycle of Circular Economy in Brazil. Source: (City of Curitiba (<http://www.cmc.pr.gov.br/>))

Once established, those spontaneous networks of circular economy usually receive support from local governments, through public policy initiatives related to the treatment of industrial waste. One example of this approach is the Green Change Program, conducted by the City of Curitiba (2018). The program encourages the selective collection of solid waste and ensures its reintroduction in the industrial production processes, by connecting, in a virtuous cycle, local consumers, communities of waste pickers, family farmers and recycling industries. Since 1991, the city government exchanges solid waste collected by communities of scavengers with horticultural products purchased from family farmers in the vicinity of Curitiba. Then, waste is marketed to recycling industries, refueling the cycle. With this action, the municipality reduced the problem of hunger, malnutrition and food quality in 95 points of the city, besides stimulating the selective collection of solid waste and giving flow the production of organic products (Figure 3).

Other forms of implementing circular economy initiatives in emerging economies promote the empowerment of communities. Those initiatives develop training programs for the recycling and manufacturing of new products using discarded and reused materials. For instance, Gatos de Rua is an initiative in the state of Pernambuco, Brazil, that trains members of low-income communities to transform recyclable materials into pieces of art, decorative ob-

jects and utilities, marketed by the brand in various stores in Brazil (Figure 4). The initiative involves more than 500 members from low-income communities, craftsmans and designers, (Gatos de Rua, 2018).



[Figure 3]: Green Change Program exchanges solid waste for organic food in Curitiba, Brazil. Source: (City of Curitiba, 2018, <http://www.cmc.pr.gov.br/>)



[Figure 4]: Gatos de Rua Project, Brazil. Source: (Author & Gatos de Rua, 2018 (<https://loja.gatosderua.com.br/>))

There are also many cases in the Brazil, where circular economy projects are part of corporate social responsibility actions. For instance, 2 furniture companies from Curitiba, Brazil. decided to join forces with a group of social entrepreneurs. The initiative resulted in a partnership where Ronconi, a mattress company donates the residues of fabric from its production process to Associação Zumbi dos Palmares, AEZP, a low-income community located in the outskirts of Curitiba. In this community, the flaps are transformed by the hands of 46 women, into pillows, bedspreads, and covers for armchairs. The products are then bought and marketed by the Paranist Movelaria, another furniture company specialized in corporate furniture (Figure 5). These covers are the result of research in design for sustainability and seek to give an alternative through social responsibility actions, to one of the recurring problems that lead to the premature disposal of chairs in the hospitality and gastronomy sector (LEPRE; VIEIRA, 2015).



[Figure 5]: Products from the Association Zumbi dos Palmares and Movelaria Paranista, Curitiba, Brazil. Source: (Author)

A similar initiative fostering circular economy in the fashion industry takes place in the city of Caruaru, North-east of Brazil. The Mulheres de Argila Project, uses the denim shavers that are left from the production of jeans to the creation of diverse handcrafts (Figure 6). This project has helped, both in the correct disposal of solid waste, and in improving the quality of life of many families in the Northeast region of Brazil.



[Figure 6]: Mulheres de Argila Project. Source: Mulheres de Argila, 2018 (<https://www.facebook.com/MulheresDeArgila/>)

The systemic relations generated in each of the cases involve marginalized populations or in conditions of socio-economic vulnerability. All of them effectively contribute to the cycles of use of pre- and post-consumption inputs, avoiding the premature end of the material life cycle and discarding unduly, resulting in positive impacts for the environment, economy and society, which is more relevant in this article, because the cases demonstrate the transforming power of inclusion of the low-income population in the processes of circular economy. That said, the next section discusses the biases of this power and signals the relevance of the role of design in promoting the Inclusive CE.

#### 4. CONCLUSION

As it was discussed, according to the principles, guidelines and theoretical matrices, CE can be considered a systemic approach to sustainability. However, when it only focuses on environmental and economic performance it becomes reductionist model difficult to be implemented in low-income contexts. All the examples presented above illustrate that, in order to implement circular economy initiatives in emerging economies, it is imperative to include and define the role of all social actors, considering them as main stakeholders in the design of the system structure. The non-observance of social impacts, when adopting the circular economy initiatives, affects its efficiency. It is known that many pressures of man on the environment are the result of inappropriate conditions linked to the tangible aspects to the satisfaction of basic needs, such as, food and safety. Also, there are needs that are linked to the tangible and intangible hedonistic aspects of life, which supersede the real need for welfare. Therefore, it takes more than looking at the relations between environment and economy to achieve sustainable development. It is essential to integrate human beings in this process, because humans structure those relationships through the understanding of their habits, their beliefs, their culture and their values. Thus, it is concluded that there can be no sustainability without the balance between the three basic pillars and mainly, without social equity (UN, 1987; 1995). Therefore, in order for the CE to be an alternative to the linear economy, it is imperative to fully incorporated human beings, and this obviously results in the increase of the complexity of the system with the involvement of subjective issues inherent to the human species, Requiring complex systemic thoughts and actions. According to Bonpam (2017), the circular economy is a 'newly born process or, at most, in its adolescence', linked to business-related phenomena, the 4.0 industry and the sharing economy, with a long road ahead and its impacts are still to be seen. In this scenario, by bringing the CE as the first principle of systemic design, it integrates to other promising initiatives in the articulation of sustainability. The examples presented in this paper confirm the validity and importance of the inclusion of the social pillar in circular economy systems, especially in emerging economies such as Brazil, where the population has long seen in the residues of industry or consumption waste as raw material for survival. Thus, considering this question as fundamental and observing its absence in the heuristics of CE, it is necessary to adopt measures that bring the social dimension as a fundamental pillar of the systemic and circular design.

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