

# **A Review on Circular Design Guideliness by Ideo and Ellen Macarthur Foundation**

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## **Abstract**

The Circular Design Guidelines (CDG) have been published by IDEO and Ellen MacArthur Foundation (EMF) over the internet as tools to help people wanting to start contributing to the planet in transition into circular economy. The guidelines were stimulated by an issue regarding an increasing global population and the amount of consumption of resources that has resulted in negative impacts on the environment. This is caused by a one-way (linear) production and consumption model, where goods are produced from raw materials, sold, used, and then burned or disposed of as wastes. Circular design (CD) act as pivot point in implementing the circular economy (CE) strategies. In this case, IDEO and EMF start to provide people who shares common goals to contribute in transition to CE using the CDG. The CDG was published in 2017 and have not been discussed in scientific journals and articles to see the eligibility of the issue using other researcher's theory about CD. The first steps of CDG is to understand the circular theory. Using systematic literature review as the methods, this research will prove the understanding of circularity steps whether these CDG can be compiled into circular product design guides.

**Keywords:** circular design, circular economy, waste management, systematic literature review.

## **A. Introduction**

In 2012, at the World Economic Forum (WEF) in Davos, Spain, the McKinsey Global Institute (MGI), a multi-national management company and the Ellen MacArthur Foundation (EMF) published an evaluation report to overcome a problem of a change from linear economy to a circular economy (EMF, 2010). Circular economy (CE) is an economy envisaged as having no net effect on the environment. It restores any damage done in resource acquisition while ensuring no waste is generated through the production process and in the life history of the product. The terms of CE often brought out by those who write about it, thus, in many ways, the origins are deliberately set in framing the antonym, to promote the term CE (Murray, Skene, & Haynes, 2017). CE describes a model of closing material loops in an economically attractive way to decouple wealth from resource usage (Van den Berg & Bakker, 2015). CE is also a regenerative system where the input of resources and waste, emissions, and energy dissipation is minimized by slowing down, closing, and narrowing the material and energy cycles (Geissdoerfer, Savaget, Bocken, & Hultink, 2017). This system stems from the idea that if an industry continues to practice linear production/economics (take-make-dispose), then at some time in the future, the natural resources on this earth will be exhausted (EMF, 2012). In many differences of meaning in CE stated by different authors, they have something in common that is the concept of closed-loop system to prevent producing waste in every production until the end of life from a product.

The emergence of a CE ultimately stimulates new thoughts in the plan to implement this CE strategy/model. The work by McDonough and Braungart recognized the importance of closing “technical” and “biological” loops in a “cradle-to-cradle” as being slightly less destructive to mother nature which is not enough of an act to reduce waste to zero (McDonough & Braungart, 2002). The important starting point is how to

design production process for these types of businesses that sell products or services. Products can also be redesigned so that they can be used for a long period of time, easy to repair, easy to improve in performance, are reproduced (European Commission, 2014). From the work of (N. M. P. P. Bocken et al., 2016), they conclude that integrating CE at an early stage of designing a products is important, because once product specifications are being made, it is difficult to make any changes, especially if the products not designed to ensure zero waste over their production line (N. M. P. Bocken, Farracho, Bosworth, & Kemp, 2014).

Initially, in the process of designing a product, no impact is considered when the product is no longer used and discarded. Products are not designed to last, so products with new designs can meet the needs and desires of consumers (Medkova & Fifield, 2016). However, product design is emphasized in the realm of aesthetics, product appeal, and brand promotion by applying smart marketing (Brown, 2008). As stated by Sophie Thomas, director of the Circular Economics at the RSA (Royal Society for the encouragement of Arts, Manufacturers and Commerce), that waste is created because there is a lack of design (RSA, 2013).

The term circular design (CD) first appeared in a report made by EMF as a development of methods/strategies in material selection and product design (standardization/modularization of components, more perfect material flow and product design that is easily dismantled) as the core of the circular economy (EMF, 2013). EMF, as a pioneer in spreading the idea of circular economics to industry, worked closely with IDEO, a leading business and design consultant in America, to create guidelines for CD. This guide is published on the site address [circulardesignguide.com](http://circulardesignguide.com) (CDG), it explains about methods that can facilitate an understanding of what circular innovation needed in developing business.

The guidelines described in the websites stated about five main stages on how to create a circular product. The five steps are: understand,

define, make, release, and advance. The needs to research these guidelines is to see if any of these guidelines already described by past researchers and author in scope of CD and CE topics. These researches want to prove whether the understanding steps of circularity can guide people to get better understanding of on how to design a circular product.

Before conducting the next stages, the understand stage is an important step to be verified. This review on the understand stages is being done in order to equalize the point of view and definition of a circularity, be it in designing a products or services. Is the understanding of the circularity is needed in designing circular products? or the definition of circularity is different? In the process of review, if the definition is different, then we need to complete the definition so that we can establish a much more effective strategy in designing circular products.

## **B. Methodology**

The methods used in this research is systematic literature review (SLR). A literature review is survey of books, scholarly article, and other resources relevant to the research area, specific issue, or theory and by doing so providing a description, summary, and critical evaluation of these work (Ramdhani, Ramdhani, & Amin, 2014). A research literature review is a systematic, explicit, and reproducible method for identifying, evaluating, and synthesizing the existing body of completed and recorded work produced by researchers, scholars, and practitioners (Fink, 2006). This method is adopted to make a critical evaluation systematically on the circular design guidelines and to find the best understanding of circular design to decide the best starting point in designing circular products.

The SLR methods also involves in analyzing all the guidelines in the understand steps released by CDG. The understand steps in CDG consist

of six steps, they are: understanding circular flow, regenerative thinking, service flip, inside out, inspirational digital system, and learn from nature. After analyzing the guidelines, every steps is compared with the previous research of circular design published.

<b>Circular Design Guide</b>		<b>Description</b>
<b>UNDERSTAND</b>	Understand Circular Flow	Technical Cycle: reused, refurbished, remanufactured, recycle; Biological Cycle: cascading the materials, extract valuable feedstock, return to nature.
	Regenerative Thinking	Creating value for every stakeholder in a wider ecosystem will help that system thrive in the long term.
	Service Flip	Turning common products into service model
	Inside Out	Understanding the implication of every materials that go into everyday products. is the products can be disassembled? Are the materials able to be recovered?
	Inspirational Digital System	Use digital system to evolve, scale, and be feedback rich to make the business scalable.
	Learn from Nature	Look out for how nature develop. It might solve the design challenge.

Table 1. Circular design guide, the understanding stage (Circular Design Guide, 2017)

Table 1 shows that the explanation of circular design begins at the understanding of circular flow. In order to understand circular flow, there are two stages of product production to be familiar with, namely the technical cycle and biological cycle. The concept of circular flow was first put forward by (McDonough & Braungart, 2002) which was later popularized by Ellen McArthur with the butterfly diagram model (EMF, 2012).

### C. Result and Discussion

The results of this study indicate that in the understand section, every designer and entrepreneur needs to understand what circular flow is technically and biologically. To design a product or a circular business model, it is not only seen from which product is sold, but whether a product can be a part of the services of a business model, and whether every human being needs to have the product they need, as stated by (Sinclair, Sheldrick, Moreno, & Dewberry, 2018; Wastling, Charnley, & Moreno, 2018).

<b>CDG BY IDEO AND ELLEN MACARTHUR FOUNDATION</b>		<b>Published Research</b>	<b>Similarities</b>	<b>Differences</b>
<b>UNDERSTAND</b>	Understand Circular Flow	(Geissdoerfer et al., 2017), (Korhonen, Nuur, Feldmann, & Birkie, 2018)	Long-lasting design, maintenance, repair, reuse, remanufacturing, refurbishing and recycling	Circularity as policy, methods model for investigating CE concept
<b>STAND</b>	Regenerative Thinking	Came from the research from (Reed, 2007)	Shifting from 'sustainability' to regeneration	-

Service Flip	(Wastling et al., 2018)	Changing the way consumer interact with products through services	Wastling et.al find the desired circular behavior key differentiating factors is the products ownership
Inside Out	-	From products to services	
Inspirational Digital System	(Mestre & Cooper, 2017)		Good practice design, identifying best case scenario for designer and industry to learn
Learn from Nature	-		

Table 2. Comparative table from [www.circulardesignguide.com](http://www.circulardesignguide.com) and research on circular design

There are some differences that can be seen based on the results of previous studies and the translation revealed on the CDG. Among them is that in previous studies it was stated that the circular strategy was first put forward as a policy compiled by the European Union to address the problem of waste and the limitations of raw materials on this earth. Bill Reed writes in (Reed, 2007) that the current local and global environmental and resources issue facing human society, a reconnection to place and to the rituals of place would help foster the shift from sustainable design to restorative and regenerative design.

## **D. Conclusion**

This paper has discussed the CDG as theory in creating a circular product. In the steps of understanding the circular flow, there are previous research that explain about how CE can create CD and make products or services out of it. This paper also discussed about CDG that released by IDEO and EMF in the perspective of academic research. It turns out that the understanding stage that have been published presented with a presentation that is more easily understood by practitioners even though it is based on scientific research. There are several things about the notion of circular flow added by IDEO and EMF to this CDG, among them is the change from the concept of sustainability to regenerative. In the concept of regenerative design, the design process is more focused on overall system changes from the factors of place, community, and stakeholders.

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