CIRCULAR ECONOMY AND THE TOURISM INDUSTRY

Berta José Fernandes Costa, Susana Cristina Serrano Fernandes Rodrigues, and Pilar Moreno Pacheco

ABSTRACT

The tourism industry has been growing at a remarkable rate and emerging as one of the major social and economic industries, and consequently one that boosts economic development that mostly supports countries' gross domestic product (GDP). At the same time, it stands out as an industry which activities generate a considerable negative impact on the environment as it is configured according to the linear model of production and consumption, in which products are disposed of after usage, causing massive waste. From this standpoint, circular economy (CE) materializes as a new strategy, as it balances economic progress with the sustainable use of natural resources.In this regard, the purpose of this research document is to outline the conceptual dimension of CE and its principles, and propose a conceptual model which may allow the tourism sector to transform itself into a more sustainable industry and one which may succeed in generating multidisciplinary benefits and in parallel mitigate environmental, social and economic constrains. For this purpose, a literature review was carried out, as a means to highlight the tourism industry as one of the sectors which may contribute significantly and positively to the implementation of the long expected circular economy, where stock value is maintained in economy for the longest period of time.

Keywords: Circular economy concept, evolution, R-principles, tourism industry, tourism industry and circular economy.

INTRODUCTION

Berta Costa *is currently attending a PhD in Tourism, in the Faculty of Tourism and Finance - University of Seville-Spain. She has a M.A. in Portuguese and English, and she graduated in Languages and Modern Literatures – Portuguese and English Studies, at the Faculty of Arts and Humanities of the University of Coimbra, Portugal, in 1997. She is an Assistant Lecturer at School of Tourism and Maritime Technology - Polytechnic Institute of Leiria – Portugal, in the areas of Tourism, Tourism and Recreation, and Catering and Restaurant Management. She is a researcher at CITUR (Centre for Torism Research, Development and Innovation) since 2018. Her research comprises a wide range of topics within circular economy, sustainability, and tourism.*

Susana Serrano Rodrigues *has a PhD degree in strategic management, from the University of Wolverhampton in the United Kingdom. She has been a Lecturer at the Polytechnic Institute of Leiria, Portugal mainly in the areas of Strategic Management, Advanced Strategic Management, Marketing of New Products and Innovation and Entrepreneurship. She has been involved in several entrepreneurship activities: as member of jury of entrepreneurship committees, as a mentor, consultant, or in product ideas development. She is a member of Centre of Applied Research in Management and Economics. Her research interests are within the field of Business Strategy, Business Failure, Entrepreneurship and Innovation, and Circular Economy.*

Pilar Moreno Pacheco, *PhD in Economics, Associate Professor at University of Seville and Vice-Dean of Faculty of Tourism and Finance. She is a Visiting researcher at Mid Sweden University and Universidad Nacional Autónoma de México, and a member of the research group "SMEs and economic development". Her academic interests within the field of tourism and hospitality are market segmentation, innovation, SMEs and information and communication technologies.*

The Tourism Industry

Over recent decades, the tourism industry has been successfully thriving as an economic activity, in which environment, culture and heritage play an important role, as destinations represent far beyond products and services. It has highly developed to one of the better positioned industries with a regular growth pattern that predominantly contributes to the countries' GDP. Leisure travellers' arrivals have increased from 25 million globally in 1950, 674 million in 2000, and 1,235 million in 2006, and the United Nations World Tourism Organization (UNWTO, 2019) calculated that international tourist arrivals would increase 6% in 2018, reaching 1,4 billion. However, due to significant growth in arrivals since 2010, that figure was met years before, which attests that travel is booming more than ever.

Likewise, international tourism revenues in countries of destination have grown from US$ 2 billion in 1950 to US$ 104 billion in 1980, US$ 495 billion in 2000, US$ 1,220 billion in 2016, and overlapped US$ 1,45 trillion in 2018. The tourism industry also brought forth US$ 216 billion in outputs as a consequence of global passenger services, enhancing the rate of tourism outputs to US$ 1.4 trillion, or US$ 4 billion a day approximately in 2017 (UNWTO, 2017), comparatively, in 2018, there was an extra US$ 121 billion in export revenue from international tourism (UNWTO, 2018). This means that export income from international tourism represents a significant source of foreign revenues in numerous countries of destination. The tourism sector also represents an important element considering exports in developing and developed countries, with the potential to minimise trade deficits and to reimburse for limited export revenues from other sectors (UNWTO, 2019).

Tourism generates US$ 5 billion per day in exports: US$ 1,5 trillion in receipts in destination countries and US$ 256 billion in passenger transportation, which constitutes US$ 1,7 trillion in exports for international tourism in 2018. Analysing these figures, it is possible to conclude that the tourism sector represents 7% of global exports and 29% of world's service exports (UNWTO, 2019). It is ranked number three after the chemicals industry and before vehicle production and food industries (UNWTO, 2017, 2019). 2018 saw an extra USD 121 billion in export revenues from international tourism (travel and passenger transport) compared to 2017. Driven by a relatively strong global economy, a growing middle class in emerging economies, technological advances, new business models, affordable travel costs and visa facilitation, international tourist arrivals grew 5% in 2018 to reach the 1.4 billion mark. This figure was reached two years ahead of UNWTO forecast. At the same time; export earnings generated by tourism have grown to USD 1.7 trillion. This makes the sector a true global force for economic growth and development, driving the creation of more and better jobs and serving as catalyst for innovation and entrepreneurship. In short, tourism is helping build better lives for millions of individuals and transforming whole communities. Driven by a relatively strong global economy, a growing middle class in emerging economies, technological advances, new business models, affordable travel costs and visa facilitation, international tourist arrivals grew 5% in 2018 to reach the 1.4 billion mark. This figure was reached two years ahead of UNWTO forecast.

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Considering the Organisation for Economic Co-operation and Development (OECD) tourism trends and policies (2018), there is evidence that the tourism industry impacts positively in the economy of the destination just as on smaller scale businesses. It has become the leading force for development, job creation, export income at an average rate of 4.2% of the GDP, 6.9% of employment, and 21.7% of service outputs in OECD countries', which represent the fundamental drivers of sustainable development (Girard and Nocca, 2017).

A vibrant economy, global consumer growing income, and the digital revolution and innovation have been boosting an unprecedented growth within the tourism sector. According to the UNWTO (2017, 2019), the tourism sector stands for as one of the biggest and most determinant drivers of employment and of economic revenue. Nonetheless, it is also putting increasingly pressure on the environment in a period of resource depletion, significantly related to price volatility and market inconsistency. These economic and environmental challenges reflect the limit of the prevailing linear 'take-make-dispose' (Ness, 2008) economic model, wherein goods are used for a limited period of time and then thrown away, causing large-scale waste.

The development of the referred sector will rely on its potential to adjust to new development and economic philosophies, new strategies and policies, governmental structures, and its expertise to adapt to and adopt new economic, social, political, environmental, and technological trends (Angelkova *et al*., 2012; OECD, 2018).

LITERATURE REVIEW

1.1. Circular Economy: the concept and its origins

The concept of CE dates back to distinct lines of thought, scientific theories, and dates, which implies that its keys principles have persisted for centuries but just in recent decades has been brought to discussion (Ghisellini et al., 2016; Andersen, 2007; Lieder and Rashid, 2016; Geissdoerfer et al., 2017). This construct derives from epistemological fields as biology, economy, and ecology, which cater for "umbrella constructs" (Hirsch and Levin, 1999:199) such as 'circular flow of income' (Quesnay,1758), 'industrial metabolism' (Simmonds,1862), the 'spaceman economy' (Boulding, 1966), 'limits to growth' (Meadows, Randers, Meadows, and Behrens, 1972), 'cradle-to-cradle' (Stahel and Ready-Mulvey, 1981; McDonough and Braungart, 2002), 'industrial ecology' (Frosh and Gallopoulos, 1989; Graedel and Allenby, 1995), 'regenerative design' (Lyle, 1996), 'remanufacturing' (Steinhilper, 1998), 'natural capitalism' (Hawken, Lovins and Lovins, 1999), biomimicry (Benyus, 2002), 'eco-effectiveness' and 'eco-efficiency', (McDonough and Braungart, 2002; EMF, 2012), 'steady state economy' (Daly, 2005), and 'performance economy' (Stahel, 2010).

Murray (2015) considers that the first approach to the CE concept was introduced by François Quesnay around 1758, with the concept of circular flow of income, encouraged by William Harvey (1628) and Marcello Malpighi's (1661) work on blood circulation, i.e. the process of the circular flow of blood around the human body pictured a relevant metaphor for the inputs and outputs of capital in an economy. Complementary, Hofman (1848), stated that in a perfect and flawless chemical industry, waste is not to be found, only goods, in the sense that a real factory utilizes all its waste, and the closer it gets to this premise, the bigger is the profit.

Furthermore, Simmonds (1862), coined the concept of industrial metabolism, which also refers to the same approach of nature behaviour regarding a waste-free approach, as he realised that in nature nothing is wasted, every single material is transformed and reutilised. Key principles in a circular economy model.

In the early decades of the 20th century, and particularly after World War II, worldwide economy accelerates, and the dominant economic model based on the resource extraction, large-scale production and sale, and disposal after usage, i.e., the take-make-dispose (Ness, 2008) model, drives to major waste production. Apprehension concerning environmental pollution, waste management, resource depletion, and limits to growth escalates, driving world governments to launch waste reduction and recycling programmes. Taking into consideration the industrialization of everyday life as well as with the modernization of steam engines and railways, and of electrical equipment, a more modern and different form of recycling sprouted: remanufacturing, as this process allows the recovery of value from used products by exchanging components or recycling used parts of those components bringing them to an almost new condition (Steinhilper, 1998).

Simultaneously, the concepts of industrial symbiosis (IS) (Parkins, 1930; Fischer-Kowalski and Haberl, 1998), and of industrial metabolism (IM) (Simmonds,1862) arise in the literature and become the focus of researchers and scholars, and decades later are regarded as the basis of the modern sustainable economic movement coined as industrial ecology (IE). IE was primarily articulated and turned into a field of science by Frosch and Gallopoulos (1989), who along with the environmental economists Pearce and Turner (1989) conceived the concept of circular economy system, modelling earlier research conducted by the ecological economist Kenneth Boulding (1966), displaying it as a closed system which establishes synergies between economy and environment. Boulding's research exhibits the economic system as the open cowboy economy (1966), contrary to the engaging spaceship economy (1966) (Andersen, 2007, Ghisellini et al., 2016; Lieder and Rashid, 2016). This approach was later developed by Stahel and Ready-Mulvey (1976) stressing the concept of closed-loop economy (Murray et al., 2017) and its implications on job creation, economic competitiveness, resource conservation and waste prevention.

During the 1970s environmental movements and consciousness regarding the environmental burden of the economic progress, along with the pursuit of a cleaner and safer environment to enhance the quality of life, carried momentum. Countries and governments conceive policies and regulate to deal with the defying growth in industrial operations, solid waste production and disposal, and the emergence of landfills and incineration, as well handling waste abroad or sending it to less wealthy countries represent waste management strategies (Moyers, 1991). It's in such a context that the 3R imperative of 'reduce, reuse and recycle' acquired higher visibility. CE emerges a broad concept that confines the various activities correlated to these processes, and it also considers their allocation.

In such a scenario of socioeconomic development, with a growing world population, mainly the middle-class, the struggle for natural resources increased rapidly. And, as Meadows et al., (1972) explained, natural resources are not abounding, which implies that this increasingly economic growth, natural resources and energy, and mankind's lifestyle is unsustainable and constitute an environmental and economic challenge. In this context and considering the limitations of the predominant economic model, the linear economy, the early stages of the what will be designated as circular economy, are configured.

The concept of circular economy was primarily drawn and introduced to the scientific community by Pearce and Turner (1990) as claimed by Su et al., (2013); Ghisellini et al., (2016) and Geissdoerfer et al., (2017). It was acknowledged by theses authors that natural resources play a crucial role on economic systems and that the implications of the linear economy, in which it is taken for granted that natural resources are abundant and that planet Earth has an unrestricted capacity as a waste sink (Cooper, 1990),

is no longer sustainable. In this regard, a CE model is suggested as an approach to promote circularity, by minimising the energy inputs and raw materials consumption, which are imperative for future sustainable resource conservation (Hilsop and Hill, 2011).

Feng et al. (2007), Greg and Doberstein (2008), Yang and Feng (2008), Hu et al., (2010) point out CE as an economic development paradigm which mimics the natural circulation of raw materials, a 'closed materials cycle or resources circulated economy' (Yang and Feng, 2008:814), considers the natural laws and the proper use of natural resources to achieve economic development, resource efficiency, equipment optimization or recovery, and management enhancement. It is also associated with an economic paradigm which considers the implementation of a preventive and regenerative eco-industrial development, together with 'green' technologies, alternative design solutions, and synergies within different manufacturing processes. As a result, material would be regenerated and consequently, energy recovered. By doing so, CE would enable awareness and the implementation of new practices and policies to achieve the long-desired sustainability.

Taking into account the adoption of a 'cradle-to-cradle' (Braungart et al., 2002) model, so as to avoid waste of valuable elements along the production and consumption chains. The implementation of this approach would allow the reduction of the production costs for the businesses and simultaneously it would also seek more holistic waste management strategies (Mirabella et al., 2013; Geng et al., 2010), it would also reduce environmental externalities as pollution, and create new employment opportunities (Ellen MacArthur Foundation (EMF), 2012; Club of Rome, 2015). To achieve this goal stakeholders (environmentalists, industrialists, and designers) should align strategies and re-think the 'eco-friendly' conception and its significance in manufacture and production processes. Braungart et al., (2002) and EMF (2012) believe that the implementation of circular economy projects should consider a new scientific and design oriented strategy known as 'eco-effectiveness', approach used to minimize and dematerialize the material flow system, which would enable a steady exchange between environment and economy and deviate from the prevailing production and manufacturing methods of 'eco-efficiency'.

Furthermore, the dependence on natural resources and raw materials for production purposes (closed system) subsisting on non-renewables places major constrains on economy since it is vulnerable to the adverse impacts of raw materials price and volatility (EMF, 2012; Preston, 2 013; Lett, 2014). Circular economy seeks to integrate economy, environment, technology and social approaches (Feng and Yang, 2007; Greg and Doberstein, 2008; Ness, 2008; Mathews and Tan, 2011; Lett, 2014, Lacy and Rutqvist, 2015, Ren et al., 2013), in order to attain future generations' wellbeing with respect to resource access.

Gregson et al. (2015) state that CE concept is still in an exploratory phase and emerges with a political goal in a context of natural resources depletion and price volatility and climate change. Its implementation targets the discontinuance of the traditional economic known as 'take-make-dispose' (Ness, 2008) paradigm. Furthermore, Haas et al. (2015), consider that CE emerges as a strategy to decouple economic growth from natural resources exploitation and to reduce waste emissions by shutting down economic and ecological loops of the resources available.

Despite the CE theoretical origin, it has been proposed that the modern formulation of the concept of circular economy and its implementation has been mainly improved by business and policy-makers (Korhonen et al., 2018). Even though, in the absence of a comprehensive conceptualisation in the literature, this construct is globally understood as a model that is restorative and regenerative by design and intends to value products, materials and their components, and also keep their highest utility (EMF, 2013, 2015, 2017; Stahel, 2016) and compelled by four principles: 1- waste equals food, considering restorative loops as the main strategy to focus on; 2- improve sustainability; 3- produce energy from renewable resources; 4- system thinking. Additionally, this economic approach is commonly associated

with the preservation and enhancing of natural capital, the optimisation of resource outputs and minimisation of system risks, i.e. CE targets the optimization of loop closing so that natural resources are extracted at a minimum level, minimising waste, prolonging product life, keeping goods at their highest level, maximising the R-imperative 'reuse' and utilising renewable energy, as a strategy to close material loops (Webster, 2015; Stahel, 2016).

Considering the implementation of CE, and that initiatives have been developing and increasing amongst businesses, it has been mostly enhanced by the European Union (EU), who made a substantial investment in order to transition to a circular economy with its Waste Directive (2008), and also The Framework Programme FP7, Horizon, 2020, which consisted on a regulation package (efficiency, effectiveness, coherence, relevance and EU added value). China, which was the first country to notably adopt a law for the CE, The Circular Economy Promotion Law (2008) (EMF, 2013; European Commission, 2014, 2015, Stahel, 2019), setting new circular goals every year; Germany that also passed a law which promoted closed cycle waste management (Guide et al., 2000) in 1996, and in 2002, Japan conveyed towards a circular industrial system which targeted recycling.

According to Masi et al., (2019), this implementation has been made essentially at three different levels: at a micro level considering businesses specific activities (Geng and Doberstein, 2008) in accordance with the 3 R-imperatives – reduce, reuse, and recycle (Ying and Li-Jun, 2012); at a meso-level, as it involves the organization of eco-industrial parks and networks, multisectoral and interdisciplinary partnerships (EMF, 2013) so as to boost a more efficient natural resource exploitation; and at a macro-level, it concerns measures and policies carried out by governments and policy makers.

Bocken et al. (2016) also consider that CE is an advantageous solution for the following reasons: it will allow to mitigate depletion of natural resources and consequently waste emissions; it will allow businesses to monitor products and goods through their life cycle, challenges concerning raw material accessibility (Bocken et al., 2016) will be solved if a circular supply chain is implemented, and the consumption of energy is minimised (Wuebbeke and Haroth, 2014).

Stahel (2019) also considers circular economy is a better alternative because its exploits natural resources efficiently, keeping the value and utility of supplies for longer time intervals, fact that distinguishes CE from the current linear economic model. By broadening the life span of goods and materials, CE slows down resources availability through economy which directly affects the production outputs and waste emissions characteristic of the linear economy. Increasing the life span of products in developed countries, it is possible to reduce by half the production and waste amounts (Stahel, 2019). For this reason, it is an imperative to enhance the circular economy R-principles, which were considered in Fig. 1 along with CE roots and its evolution and explored separately.

Fig. 1- CE concepts, evolution, R-Principles and author's inputs.

CE Concept and its Evolution	Author's Inputs
Circular Flow of Income	François Quesnay, (1758)
Industrial Metabolism	Simmonds, (1862)
Spaceman Economy	Boulding, (1966)
Limits to Growth	Meadows, Randers, Meadows, and Behrens, (1972)

CE 4-R Principles: reduce, reuse, recycle, redistribute	Daly, (1977); Karl-Henrik Robèrt, (1991); Cooper, (1994); Yoshida, (2007); Larson and Taylor, (2000); Andersen, (2007); Clapp and Swanston, (2009); Bilitewski, (2012); Hassini *et al*., (2012); Jiao and Boons, (2014); Ghisellini *et al*., (2014); Yan and Feng, (2014); Diener and Tillman, (2015); Kasidoni *et al*., (2015); Reike *et al*., (2018), EMF (2019)
Cradle-to-cradle	Stahel and Ready-Mulvey, (198)1; McDonough and Braungart, (2002)
Industrial Ecology	Frosh and Gallopoulos, (1989); Graedel and Allenby, (199)5; Ehrenfeld and Gertler, (1997)
Regenerative Resign	Lyle, (1996)
CE 8-R Principles: rethink, refurbish, remanufacture, repair	Thierrry *et al*., (1995); De Brito & Dekker, (2003); Fernández and KeKale, (2005); King *et al*, (2006); Gehin *et al*., (2008); EMF, (2010), (2013); Liu *et al*., (2009); Stahel, (2010); Hultman and Corvellec, (2012); Bastein *et al*., (2013); Wijkman and Skânberg, (2015); Lieder and Rashid, (2015); Reike *et al*., (2018)
Natural Capitalism	Hawken, Lovins and Lovins, (1999)
CE 10-R Principles: redesign/ rethink, cradle-to-cradle, long-lasting product	Cooper, (199)9; Nakajima (2000); McDonough and Braungart, (2002); McDonough, (2002); EMF, (2012); Stahel, (2013, 2014), Reh, (2013); Prendiville *et. al*, (2014); Geissdoerfer *et al*., (2017)
Bio mimicry	Benyus, (2002)
CE 11-R Principles : refuse	Miller and Spoolman, (2002); Clapp and Swanston, (2009); Black and Cherrier, (2010); Alwood *et al*., (2011); Bilitewski, (2012); Kasidoni *et al*., (2015)
Eco-effectiveness and Eco-efficiency	McDonough and Braungart, (2002); EMF, (2012)
Steady State Economy	Daly, (2005)
Performance Economy	Stahel, (2010)
CE 13-R Principles: repurpose, recover,	Li, (2011); Stahel, (2010); Yan and Feng, (2014)
CE 15-R Principles : remine, return	Reike *et al*., (2018)

The Circular Economy's R Principles

Reducing, Reusing, Recycling, Redistributing

Circular economy encloses the overall activities within the scope of the reducing, reusing and recycling materials processes, as well as the distribution and consumption of these materials. It is recognised that raw materials have to be processed in cycles, by means of biogeochemical processes or by human interference (one of the premises of CE), otherwise environment will continue to deteriorate at a surprising pace (Karl-Henrik Robèrt, 1991). Cooper (1994) also states that countries and governments introduced recycling goals for urban waste but failed to realistic and functional measures to encourage manufacturing and production processes which would allow longer lasting products. In order words, awareness concerning practices that encircle reducing, reusing and recycling were developing, however, the need to also focus on consumer durables and packaging were and still are also urgent.

Moreover, CE practices cannot sustain recycling, as to some extent it turns out to be too difficult and demanding, because the amount of waste produced is not equivalent to the degree of resources depleted: characteristic of an economic open-ended system (Andersen, 2007). In a closed system energy and matter expenditures are levelled, as the volume of waste produced is equivalent to the quantity of resources used, and the waste generated would be converted into raw material and re-enter the manufacturing line once more. As a result, economy becomes circular, and stands out as a distinct approach from the 'take-make-waste' economic model and decouple the economic activity from the exhaustion of natural resources and drive towards renewable energy sources. Industrial products and materials can be reused repeatedly and redistributed in their original shape or with minor improvement or modifications to new customers (EMF, 2019).

In a restorative by intention and design industrial system, the focus should be placed on use and reuse of products rather than on discarding them before their value is fully exploited (Wijkman and Skânberg, 2015; Waste Resource Action Programme, 2016).

Rethink, Refurbishment, Remanufacturing, Repair

It is a fact that the prevailing linear economic model based on the 'take-make-dispose' paradigm is driving to resource depletion and is no longer viable. To tackle this situation and the growing need to rethink, redesign and head towards a promising future, the Ellen MacArthur Foundation (2010), whose mission is to enhance the transition to a circular economic model, has been working with businesses, governments preparing society and developing a framework for the implementation of CE.

CE is restorative and regenerative by design (Lacy and Rutqvist, 2015) and targets to maintain the highest utility and value of products as long as possible, differentiating the various technical and biological cycles, that is implement an economic system in wherein long-lasting design, reuse, refurbishment, remanufacturing, and recycling of goods is contemplated. Effectively, CE cannot ensure 100% recycling opportunities (Andersen, 2007), due to the entropy law (Daly, 1977). It is reaffirmed that an economic industrial system based on the 'reuse' R-principle of products, enhancing remanufacturing, will improve the natural potential of the environmental to restore itself (EMF, 2013; Bastein et al., 2013).

The EMF (2015) also demonstrates that the implementation of a CE approach should take into account system thinking, as decision making of the stakeholders (entrepreneurs, companies, and governments) engaged in the manufacturing processes, has a huge influence in the value chain. It is further acknowledged that decoupling the economic approach from natural resource consumption as to be one of the principles of a circular economy. The emphasis has to be put on value retention and on stock optimization and on product life extension (Stahel, 2013, 2019).

Reike et al. (2018) highlight 'refurbish' emphasising that it corresponds to the process that products undergo when upgraded, i.e. parts and components of a bigger framework have to be replaced so that the life cycle of the product is extended (Brito & Dekker, 2003; Fernández and KeKale, 2005).

'Remanufacturing' is also explored as the process of repairing a product, starting by setting up an inspection, followed by the product disassembly, cleaning, and repairing, through industrial processes in monitored atmospheres (shop, factory) (Gehin et al., 2008; Liede rand Rashid, 2015).

In regard to 'repair', it is referred that it corresponds to the life extension of the products (King et al., 2006), by repairing parts and components (Stahel, 2010), or making modifications (Thierrry et al., 1995). This life extension procedures can be executed by different parties (owners, technicians, and repair businesses) without experiencing ownership transfer (Hultman and Corvellec, 2012).

Redesign, Rethink - Cradle-To-Cradle - Long Lasting Products

Circular economy is generally connected with the 'recycling' R-principle, nonetheless, this represents the less sustainable response to tackle with environment sustainability questions, if compared to the remaining R- principles when dealing with resource efficiency and profitability (Stahel, 2013, 2014, 2019). Some industrial waste is only recycled to a certain extent and other materials are not recyclable at all. As an example, fibers are recyclable 4-6 times, whilst some metals cannot be recycled at all and are found to be "unlimited manifold recycling" (Reh, 2013); other articles like plastic cannot simply go through recycling processes as in their components there are impurities, as ink or metals (Prendiville et. al, 2014). Therefore, different solutions considering the nature and the components of what is discarded are required. CE is unable to guarantee that products or their component parts are 100% recyclable, as economic systems are not totally circular when it comes to waste, debris and energy, as a result of the entropy law (Daly, 1977; Andersen, 2007).

So as to attain equilibrium environmentalists, industrialists and designers ought to harmonize strategies and policies and put into practice the 'eco-friendly' concept when tackling manufacturing and production processes. McDonough and Braungart (2002) and the EMF (2012) also believe that CE ought to pursue a new and design-oriented technique known as 'eco-effectiveness', so as to minimize and dematerialize the material flow system. This procedure would enable a harmonious exchange between environment and economy and abandon or at least reduce the modern manufacturing practice coined as 'eco-efficiency'.

Furthermore, McDonough and Braungart, (2002) consider that a 'cradle-to-cradle' design concept, rather than a 'cradle-to grave' life cycle should be implemented, since the life cycle of products does not necessarily end in a 'grave', the equivalent to a landfill. Seeking a 'cradle-to-cradle' economic model products are designed and fabricated with a new purpose and with 'long-lasting' design (Geissdoerfer et al., 2017), through waste-free industrial processes. In this context, CE does not only stand for a preventive model (McDonough, 2002) with the purpose of reducing natural resource depletion and waste emissions, but also emerges as an approach which considers the correlation between environment and industry (Cooper, 1999; Nakajima 2000). It far exceeds the concept of sustainability, as it stresses that pursuing efficiency through design and service supply presupposes a reduction in inputs, enhancing resource usage and economic development from natural resource utilization. For this purpose, policies and practices should concentrate on pursuing three main approaches: 'low consumption', 'low emission of pollutants', and 'high efficiency' (UNEP Paris Report on CE, 2006). Additionally, Stahel (2010) reckons that economic stakeholders ought to commit themselves to strategies that would allow to diminish resource consumption at the expenses of waste emissions and consequential environmental threats, and therefore, attain head towards sustainable development.

Mathews and Tan (2011) also consider that eco-industrial approaches, which contemplate industrial circular strategies which enable the transformation of waste, in a particular manufacture phase,

into a beneficial chain input at a different stage, have been emerging concerning sustainability of industrial business.

Refuse

Additionally, Reike et al. (2018) presented the imperative 'refuse' as a concept relying on two distinct perspectives, the producer and the consumer's perspectives. Considering the producer's process, the Concept and Design Life Cycle of products ought to be considered, as designers have the opportunity to refuse to accept or approve certain production processes, which may involve waste outputs and the use of hazardous materials or substances (Bilitewski, 2012). Considering the consumer's approach, there is the possibility to choose to purchase limited quantities of products or reduce its use (Miller and Spoolman, 2002; Black and Cherrier, 2010; Alwood et al., 2011). 'Refusing' also relate to the refusal to approve packaging, bags, or containers whenever they constitute waste (Clapp and Swanston, 2009; Kasidoni et al., 2015).

Repurpose, Recover

'Repurpose' or 'rethink', as it is also commonly referred to (Li, 2011), refers to the strategy of utilizing discontinued or obsolete parts or components and providing them with a new purpose or another function, enabling these discarded equipments to re-enter a new life cycle (Reike et al., 2018; Yan and Feng, 2014). Additionally, Stahel (2010) points out that 'repurpose' may also relate to the removal of parts or components of products that are unsuitable for use.

'Recover' or 'Re-mine' are R-imperatives frequently disregarded in addressing the CE principles. As underlined by Reike et al. (2018), this concept refers to the "retrieval of materials after landfilling phase (Yan and Feng, 2014).

A comprehensive and systematic address at highlighting the R-imperatives and their use is a relevant strategy for a thriving CE implementation, considering that some of these imperatives are an inherent result of the laws of physics, even though others ought to be linked to the existing economic model of developing countries.

Remine, Return

The 'remine' R – principle is not generally used when operationalizing circular economy strategies or is often disregarded, along with 'refurbish' and 'repurpose'. It relates to the recovery of materials immediately before the disposal phase, i. e., valuable parts form discarded goods are selected and retrieved and used in the production or remanufacture of products or components (García-Rodríguez et al., 2013; Reike et al., 2018).

The 'return' concept refers to the throw back of products or components but in an environmentally innocuous way, which may include appropriate treatment and handling or even containment.

CE stands out as an advantageous concept to attain sustainable development. However, thorough analysis and critical examination and debate on its principles and implementation is necessary to guarantee that it will be disseminated, adopted, and put into practice, not only by businesses but also by policy makers.

Adopting eco-friendly behaviours, be environmentally aware, and sustainability have become trendy topics over the past decades and continue to gain momentum. The tourism industry is a significant business sector, which means that it can play a fundamental role in modifying the current environmental practices that have been leading to natural resources depletion, and respond to the needs of the present generations without endangering the future of the generations to come (Rio, 1992). So, the challenge is to transition from a linear to a circular economic model, considering the design and the development of new products and services, regarding waste as a valuable resource and rethink logistics networking, and the engagement of stakeholders and policy makers in providing and developing a support structure.

Tourism stakeholders are demanding for approaches and resources to become more sustainable and the moment is to create responsible businesses, implementing practices and policies that consider the triple bottom line (Elkington, 1994, 1997) so as to commit people, community and environment. According to Chiliya and Groenewald (2017), decision making on sustainable development has to engage different stakeholders (various levels of authorities, the private sector, NGOs, and communities) and no longer be of the exclusive competence of the governments. The more sustainability challenges are considered at the planning and implementation levels and the more actors are involved in the decision making process, higher is the potential of being successful and attain sustainability goals.

The CE principles can be implemented in the tourism sector through the operationalisation of business models based on sustainable principles, and the transition to a CE model. Drafting a circular tourism approach could enhance the sustainable use of resources as well as an intelligent and viable supply of all the services related to this sector. One of the industries in the scope of the tourism industry, the hospitality sector (hotels and the various accommodation facilities) has to commit to sustainable initiatives, as the UNWTO (2019) estimates it accounts for 1% of the global carbon dioxide emissions, a number expected to increase as this sector is expected to continue to experience growth and demand. It is also demonstrated that 75% of the environmental impact of this industry directly relates to resource waste, and to resources utilization (energy, water, consumables). The Hotel Global Decarbonisation Report (2017) indicates that the accommodation sector will have to reduce gas emissions per room, 66% from 2010 levels, and 90% by 2050 in order to line up with the Paris Climate Agreement, a settlement that targets to maintain global warming below the 2ºC boundary.

In this context, the challenges are to keep pace with the tourism industry growth, increasing number of people travelling, accommodating more and more travellers and building more infrastructure, and at the same time reduce the carbon footprint of the sector. The transition to a CE model, the implementation of circular economy principles, or drafting a circular tourism approach could enhance the sustainable use of resources as well as an intelligent and viable supply of accommodation, food, wellness services, energy and water flows, and all the services that allow the travelling experience (Manniche et al., 2018).

Taking into account the implementation of the CE R-principles on the tourism industry, there is not significant academic literature to build upon, neither case studies or confirmatory approaches or empirical validation. Therefore, there is a gap in the literature to fill.

CONCLUSION

The concept of Circular Economy has evolved and has become a trending topic, with expanding relevance, concerning management policies as well as at an academic level. Stakeholders and consumers are, more than ever, vigilant with respect to environment sustainability and view CE as an approach to

promote clean growth and ameliorate environmental conditions. Far beyond the prevailing economic model of production and consumption, CE sustains the effective use of natural resources to attain the transition from open-ended cycles of materials and energy to a system of closed cycles, to achieve less wasteful industrial processes. CE is also considered a preventive and regenerative approach as it minimizes the loss of valuable materials, considers waste emissions as potential resources for production inputs, and controls energy outflows by narrowing material and energy loops. It discards the concept of waste emissions, stating that the life-cycle of products ought to be planned in the design phase to avoid residues. In this perspective design and eco-design play a major key role in the CE implementation, as it represents an approach to reduce environmental impacts throughout the life-cycle of products.

Circular economy stands out as emerging and transformational economic model which intends to redesign global production and consumption models as well as to minimise the inconsistency between economic growth and environmental sustainability. It is an approach that will allow an enormous change in the role performed by resources within the economy, i.e. waste emissions would become valuable inputs in other processes, products would be repaired or upgraded instead of being discarded. In today's economy, where high and volatile resource prices are consistent, CE offers considerable business opportunities, but to do so, stakeholders have to concentrate on collecting and sharing date, exchange good and preventive practices, invest in innovation and research, and above all promote collaboration among the different actors (governments, businesses, companies, etc.). Stakeholders play a key role in accelerating the transition to a Circular Economy model, in a period of time compatible with the response to global challenges as climate change, water and resource scarcity, pollution, and take responsible decisions that may contribute to achieving sustainable development within a reasonable timescale.

This document provides an in-depth understanding of the CE concept, its evolution, its principles, and the CE R-principles. It is useful for research into circular economy and its connectivity with the tourism industry. Therefore, it constitutes a contribution to identify the main trends in circular economy research and tourism and, thereafter frame future research initiatives are conceivable.

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