Spectrum of Circular Economy and its Prospects in Logistics

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Abstract
The paper explores and reviews the concept of Circular Economy (CE) by conducting a systematic literature review (SLR) to develop an in-depth understanding of the growing trends of CE, its framework, implementation, and barriers. The overview of published literature is pigeon-holed under 10 dimensions. Furthermore, the paper explores the attention given to the Logistics sector from the perspective of Circular Economy and highlights the need for in-depth research to develop new frameworks/models for CE's implementation in the Logistics sector to establish Circular Logistics as an outcome.

Keywords
Circular Economy; Circular Logistics; Sustainability; Environmental.

1. Introduction
Rapid growth in technological advancement, automation, and development of cross border trade has and is changing the rules of the game for businesses. This development has raised the standards of production and living, and made life easier for consumers, but at the same time it has also raised serious concerns due to excessive resources depletion and that the current economic system is developed with no concern for the environment and clue for recycling (Su et al., 2013). Jowit (2008) clearly marks it as an *'ecological credit crunch'* that the world is heading to, with approximately resource usage ratio being 30% higher than the earth can replenish each year.

Such concerns have not just surfaced recently but have gained the attention of scholars since the last 5 decades, in particular, when Boulding (1966) pointed out the damages caused to the environment and resource depletion. Over the last two decades, the concept of sustainability has gained momentum and as a result a newer concept, i.e. Circular Economy, has emerged. CE is believed to have its origin in Ecological and Environmental Economics (Ghisellini et al., 2016) and Eco-Industrial Development (EID), which suggest that both a healthy economy and a healthy environment can coexist (Geng & Doberstein, 2010).

In realisation of the fact that the current production and consumption pattern are not long lasting (Jowit, 2008), businesses have been forced to rethink their strategy to minimise their negative impact to the environment (Lai et al., 2013). In particular, increased awareness and knowledge about the facts due to efficient information sharing, has increased this push and businesses have to rethink at least for the sake of their market share (Yuan et al., 2006).

This paper is of an exploratory nature and by no means it intends to neglect the importance of technology and its development, rather the paper focuses on the attitude towards the environment, sustainability, and future generations; under the current economic system and its implications to the field of Logistics. The emergence of this concept is indeed timely and in realisation of its necessity, therefore the contemporary nature of this paper is highly concurrent.

The remainder of this paper addresses the following topics: Section 2 covers the research methodology followed by this research; Section 3 defines the CE concept, its framework, and an overview of published literature; Section 4 discusses the prospects of CE in Logistics, and barriers/ enablers in its implementation; and finally, Section 5 provides the conclusions.

2. Research Methodology

The recent attention paid to the concept of CE has attracted authors to explore its scope and implementation in different dimensions, including the field of Logistics. This research firstly analyses the published literature utilising a systematic literature review (SLR) adapted from Garza-Reyes (2015). Figure 1 provides an overview of the SLR by describing its phases, objectives, methods adopted, tools utilised, and their location within the article. On the other hand, Figure 2 presents a glance of descriptive analyses of the published literature in terms of journal publications on the topic of CE, reports published by organisations working with CE, and books published from 1990 to December 2016.

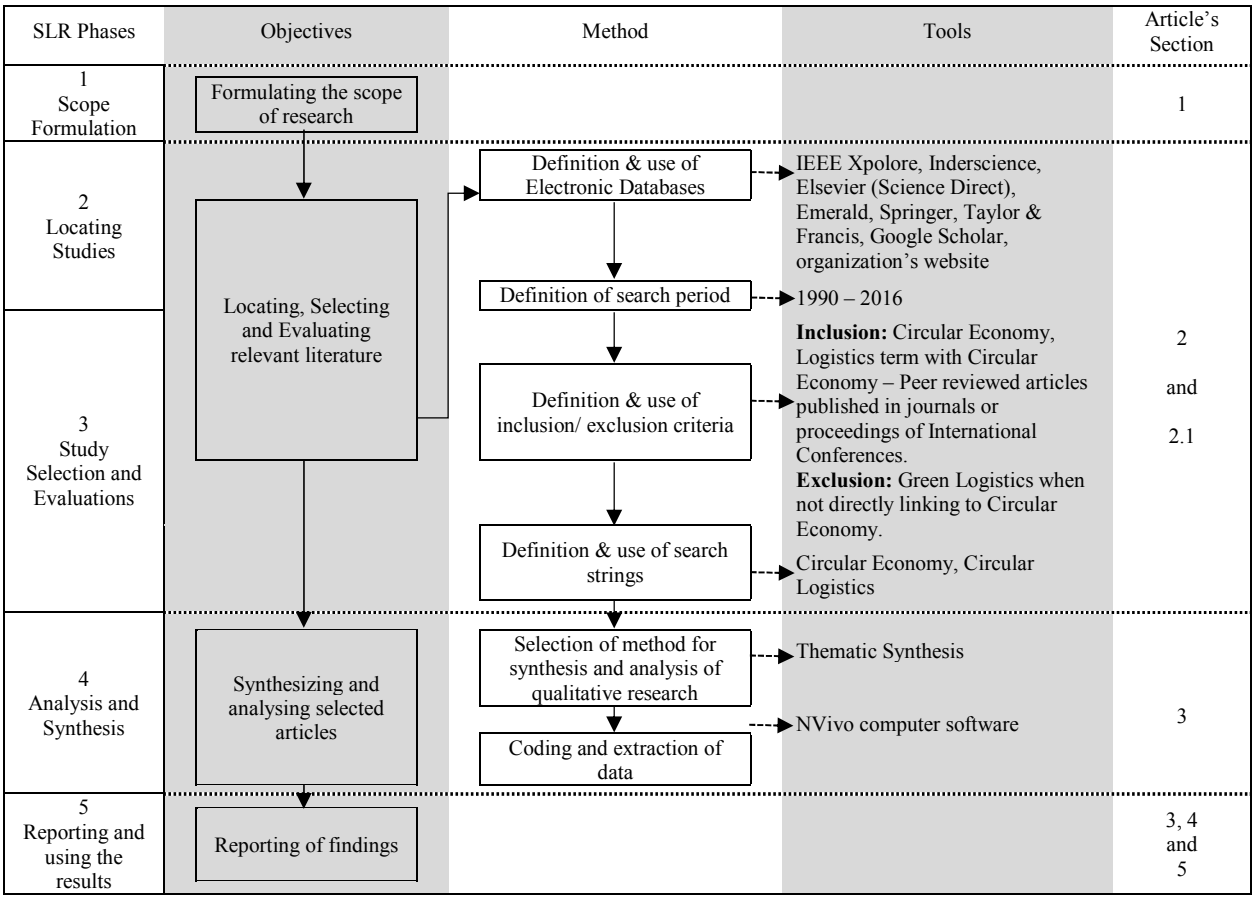

Figure 1: SLR phases, objectives, methods, tools and location within the article (adapted from Garza-Reyes, 2015).

Papers and articles were searched online using the keywords *'Circular'*, *'Circular Economy'*, and *'Circular Logistics'*; and were accessed using Science Direct (www.sciencedirect.com), Emerald Insight (www.emeraldinsight.com), Inderscience (www.inderscience.com), Springer (www.springer.com), Taylor & Francis (www.tandfonline.com), IEEE Xplore (ieeexplore.ieee.org/Xplore/home.jsp), Google Scholar (scholar.google.co.uk), websites of organisations working/promoting CE (e.g. www.ellenmacarthurfoundation.org; circle-economy.com; www.wrap.org.uk; www.mckinsey.com), and reports from their respective authors' websites. These databases were considered major sources of information to establish an understanding of the CE concept and to develop arguments for further research needed within the field of Logistics. The major criteria for the selection of published work was that it had to explore the scope of CE, building on, expanding the understanding, and exploring further research possibilities by identifying any gaps in the development/implementation of CE in the field of Logistics. The research only included articles which had been published with direct focus, and within the purview of Circular Economy/System. Any paper written with

similar ideas but not directly addressing them from this perspective of CE were excluded. For instance, 'Green Logistics', where it did not establish any direct relation to Circular Economy.

2.1 Descriptive Analysis

Based on the SLR, the research included the review of 10 books, 13 reports published precisely to address the topic of CE, its development, strategies, implications, and evaluation, and 106 journal and conference articles published in well-known journals. Figure 2 below presents infographics of the descriptive data.

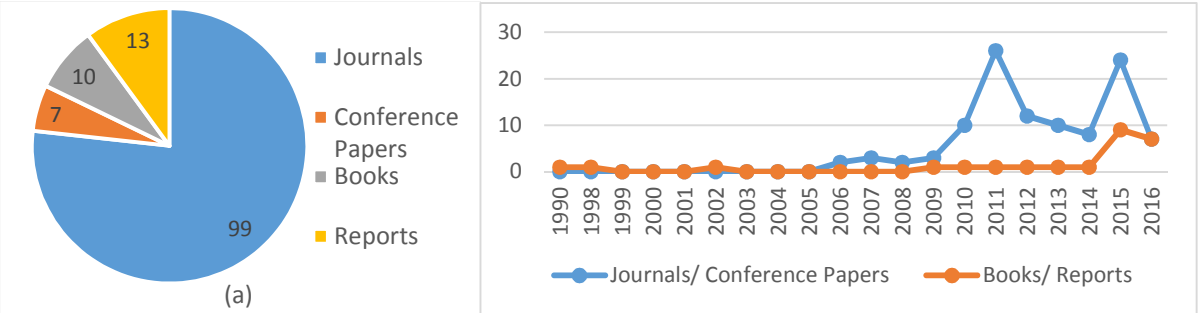

Figure 2: Descriptive data - (a) Proportion of journal, books and reports publication, (b) Year of publication

3. Circular Economy – Development & Definition

The concept of CE has evolved over last 5 decades, but it is believed that its roots cannot be traced back to any specific point in time (Webster, 2015) and that it has existed for much longer than it is thought to be (Murray et al., 2015). The core uniqueness of the concept is its contrast to the linear approach of taking – making – disposing (Ellen MacArthur Foundation, 2015), also known as *"Cradle to Grave"* (Braungart, 2002), and introducing new concept of '*roundput'* instead of '*throughput'* where the resources are used but not used up (Webster, 2015). In published work, the concept is believed to be conceived by a pioneer environmental economist, Professor Kenneth E. Boulding (1966) under the realisation of resource scarcity, climat change, and attitude towards these problems (George et al., 2015).

3.1 Definition(s) of CE

At first glance, it might appear to be that CE is perhaps a new title, cover, and wrapping to the concept of recycling, but at a closer examination, it is evident that there is a difference between the two as CE does envelop the concept of recycling within its broader scope but recycling does not have the same privilege. Past development in the forms of Green (McKinnon et al., 2010), Ecological, Environmental Friendly, Sustainability, Lean (Thomas Goldsby, 2005), Just-in-Time - JIT (Liker, 2004), Recycling, and other similar concepts have their significance but they all seem to be more reactive. Within the realm of current challenges, new and different rules of game are needed (Webster, 2015) as scholars believe that the economic growth model over last 250 years has been living on borrowed time (Lacy & Rutqvist, 2015). CE emerges with a more proactive approach, by tackling the problem of resource depletion (Gregson et al., 2015) (Singh & Ordonez, 2015) (Li et al., 2013), resource efficiency (Hu et al., 2011) (Schulte, 2013), and environmental issues at the stage of design of products and services (Velis, 2015), instead of managing the issue at the end of life cycle (Ellen MacArthur Foundation, 2015). The following four definitions of CE lay a foundational understanding to develop further arguments on their basis.

"A circular economy is one that is waste-free and resilient by design. It is a new economic model that is ambitious as well as practical. Designing the economy in a way that is restorative of ecosystems, ambitious with its innovation, and impactful for society, is a bold challenge but one that is achievable when guided by the principles of the circular economy" (Circle Economy, 2016).

"In a circular economy profits, jobs and growth come not from extracting, moving, shaping, selling and dumping ever more resources, but from the work done and value created by handling resources with sufficient care that ecosystems and total natural resources actually expand, making it possible to meet human needs everywhere" (Greyson, 2015).

"The circular economy is one that is restorative and regenerative by design and aims to keep products, components, and materials at their highest utility and value at all times, distinguishing between technical and biological cycles" (Ellen MacArthur Foundation, 2015).

"The circular Economy refers to an industrial economy that is restorative by intention; aims to rely on renewable energy; minimises, tracks, and hopefully eliminates the use of toxic chemicals; and eradicates waste through careful design" (Webster, 2015).

These definitions address the production (and service) process as a whole within one concept by focusing on pretty much an integrated supply chain mechanism. The concept ensures that the system must be mindful of resource depository, design/process development for the maximum utility, and output to be designed with maximum life cycle and end of life cycle management.

3.2 Architectural Framework of Circular Economy

Rapid developments over the concept of CE are emerging, and three major frameworks which are overlapping on few aspects emerge to define the spectrum of Circular Economy, see Figure 3. These frameworks and definitions of CE truly envelop the triple bottom line (Anderson, 2007) by addressing the environmental, societal, and economic growth model. One of the key developers of these frameworks, Ken Webster, emphasizes that *'the boundaries of circular economy are not defined, nor are they ever likely to be'* (Webster, 2015).

The five core aspects outlined by Webster (2015) provide the foundational framework on which CE stands. These aspects are represented in other two frameworks and their connections are shown by lines in Figure 3. The additional aspects in other frameworks are the *'Share'* elements of the ReSOLVE framework (Ellen MacArthur Foundation, 2015) and the *'Health'* aspect of the CE (2016) framework. Two main strategies remain at the core of all three frameworks; max-min policy of waste and max-max policy of utility – maximising the effort to minimise waste and maximising the effort to maximise utility. Webster's (2015) framework points to design out any activity that creates waste and to build a resilient system with maximum utility of energy from renewable resources, thinking in systems looking at overall supply chains and impact of the business activity, while thinking in cascades.

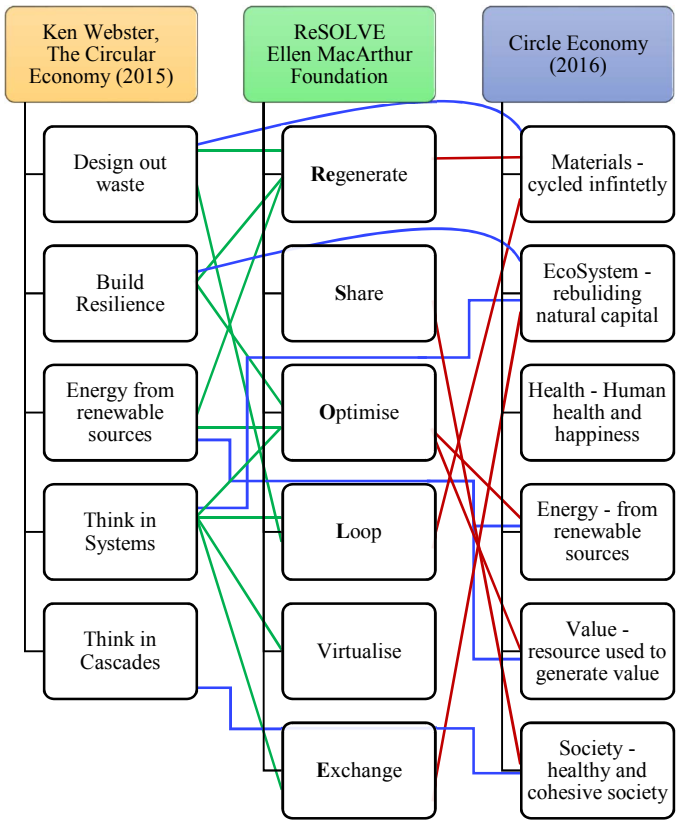

Figure 3: Architectural Framework of Circular Economy

The ReSolve framework by Ellen MacArthur Foundation (2015) is an internal development on the foundations laid by Webster (2015). The major focus being on moving to renewable resources and establish a good ecosystem by returning biological resources to the biosphere. An additional aspect of Sharing Economy is added, where participants within an economy share their resources for maximum utility and also promote their reusage. The framework further elaborates to optimise the utility of resources and keeping them in loop, and at the same time to virtualize by dematerialising such as moving form paper books to e-books, and replacing the old technology with new for effective and efficent usage of resources such as solar panels, 3D printing, etc.

The third framework developed by Circle Economy (Circle Economy, 2016), based in the Netherlands, further adds another features of health and society. While building on the same aspects as addressed in the earlier two frameworks, it also focuses on human health and happiness, and a healthy and cohesive society as core aspects of the CE framework; which in a way is the outcome of implementing the earlier frameworks but it is vital to nail them specificially while designing an economic system.

3.3 Overview of published literature

The analysed literature reveals the explored aspects under the purview of CE. These include **academic aspects** defining its conceptual framework (Murray et al., 2015), its holistic view (Webster, 2013) (Ellen MacArthur Foundation, 2015), its relationship with sustainable development (Anderson, 2007) (Sauve et al., 2016) (Yuan et al., 2006), and Risk/ Downsides of CE (Lee et al., 2014) (Bilitewski, 2012). As the concept directly deals with **resource**

depletion/utilisation, thus the published literature covers dimensions of resource preservation (Gabriela-Cornelia et al., 2015), energy conservation (Pin & Hutao, 2007) (Pan et al., 2015), resource efficiency (Hu et al., 2011) (Schulte, 2013), and resource recovery and reutilisation (Gregson et al., 2015) (Singh & Ordonez, 2015) (Li et al., 2013). Scholars also examine the interplay of **environment and economics systems** (Ghisellini et al., 2016) (Anderson, 2007) (Boulding, 1966) by looking at low carbon economy models (Duan et al., 2011), and examine the **policy implications** in terms of process analysis (Ghisellini et al., 2016), model of economic growth (George et al., 2015) (Bartl, 2015) and zero emission policy (Liu et al., 2012). In recent developments of the research, the focus has been on **strategies** utilised for the implementation of CE; such as 3R [reduce, reuse, recycle] (Xuan et al., 2011), 6R [reduce, reuse, recycle, recover, redesign, remanufacture] based closed-loop material flow (Jawahir & Bradley, 2016), business process reengineering approach (Schulte, 2013), green virtual enterprises (Romero & Noran, 2015), urban circular economic system (Tong & Tao, 2016), pricing strategy (Zhilei & Wei, 2011), landfill reduction (Scharff, 2014), leapfrog development (Geng & Doberstein, 2010), and waste to energy (Pan et al., 2015). Researchers have also explored the **implementation models** by exploring cultural model of Hakka Living (Liu, 2012), biogas project (Duan et al., 2011), systems dynamics and multi-objective programming model (SDMOP), and eco-industrial parks/ village (Wenbo, 2011) (Duan et al., 2011) (Wenbo, 2011). Some methods and tools to **analyse** (Jian & Kun, 2011) are waste input-output analysis (Li, 2012), life cycle assessment (Strazza et al., 2015), and two life cycle assessment (Scheepens et al., 2016).

China has widely adopted the concept of CE and many publications are focused on the driving forces for CE in China (Park et al., 2010) (Xinan & Yanfu, 2011), the implementation process and results at regional level (Lihong & Hui, 2011) (Junjie et al., 2011) (Guo-gang, 2011) (Geng et al., 2009) (Qing et al., 2011) (Xue et al., 2010) (Guohui & Yunfeng, 2012), methods to critically evaluate and analyse (Su et al., 2013) (Lee et al., 2014) (Wenbo, 2011) (Liu et al., 2012) (Wu et al., 2014) (Guo-gang, 2011) (Chun-rong & Jun, 2011) (Li & Su, 2012) (Xu et al., 2009) (Jiao & Boons, 2015) (Pin & Hutao, 2007) (Qing et al., 2011) (Xiong et al., 2011) (Li, 2012) (Geng et al., 2012), implementation challenges, constraints, and barriers (Naustdalslid, 2014) (Zhu et al., 2010) (Geng & Doberstein, 2010) (Li et al., 2010), action programs and counter measures (Qiping, 2011) (Shen & Qi, 2012) (Zhijun & Nailing, 2007), and public industry awareness of the concept of CE (Liu et al., 2009) (Liu & Bai, 2014).

At **Industrial** level, researchers have explored CE's implementation in the paper making industry (Li & Ma, 2015), electric power industry (Zeng & Zhang, 2011), mining (Zhao et al., 2012) (Ru-yin & Xiao-ting, 2009), agriculture (Zabaniotou et al., 2015) (Jun & Xiang, 2011) (Junjie et al., 2011) (Xi, 2011) (Xuan et al., 2011), oil & gas (Kun & Jian, 2011) (Jian & Kun, 2011), RO desalination (Landaburu-Aguirre et al., 2016), construction industry (Smol et al., 2015), iron and steel industry (Ma et al., 2014), chemical industry (Liguori & Faraco, 2016) (Li & Su, 2012), leather industry (Hu et al., 2011), animal husbandry industry (Liang et al., 2006), tourism (Ping, 2011), two life cycle assessment – water tourism (Scheepens et al., 2016), and automotive industry (Despeisse et al., 2015). Researchers have further explored the concept of manufacturing and re-manufacturing (Li et al., 2013) (Lieder & Rashid, 2016) (Kurilova-Palisaitiene et al., 2015), product service systems (Tukker, 2015), process engineering (Reh, 2013), consumer acceptance of CE (Weelden et al., 2016), and how to optimise industrial structure (Lihong & Hui, 2011). Few articles also explore the important role of CE towards sustainable **supply chain management** (Pan et al., 2015) (Genovesa et al., 2017) and the necessity to develop circular models of supply chain (Velis, 2015).

The above mentioned research avenues covers the broad spectrum of product/ service and related business aspects. They have received considerable attention by scholars and it would be correct to say that more research would come to surface soon to develop further understandings.

4. Circular Economy and its implementation in the Logistics Sector

While conducting the search using the string words *"Circular Logistics"* to search for journal articles/conference papers and the word "Logistics" within the journal articles on the topic of CE, only 21 article were found, discussing the implications of CE in the Logistics sector. These 21 articles (summarized in Table 1) are part of the total 107 selected articles for this paper and are discussed below.

If we look at the historical perspective, scholars have focused their attention towards Logistics and Supply Chain Management at the same time as the world's attention has focused on environmental aspects. The important role of supply chain, which includes Logistics, is an inevitable choice while attempting to make a business sustainable (Park et al., 2010). Recent trigger of attention being focused on the correlation between CE and Logistics (Guihua, 2013) highlight the importance and urgency to develop new models of logistics in alignment to CE (Kai et al., 2010). The concept of Circular Logistics is also linked with Green system (Guo-shen et al., 2010) (Gui-hua, 2010) and is believed

to be at the core of CE (Rong, 2014), as well as with 3PL (Yuan & Xi-long, 2009) and is considered as value increment multiplier being the core value in a recycling economy (Zhongzhi & Haochen, 2011).

Table 1: Literature published on the topic of Circular Logistics

No	Author	Title	Paper Type
1	Rao Zhao; Da-wei Hu; Lan Zhu; (2015)	Design of Supply Chains with Integration of Reverse Logistics of Automobile Parts	Conference
2	Zhao Rong (2014)	Study on the Sustainable Development of Logistics for Circulation Economy	Conference
3	Joachim Kuhn (2015)	End-to-end supply chains: The solution?	Conference
4	Zheng Kai, Wang Ruijiang, Ru Yihong (2010)	Analysis on economic and environmental benefits of circular construction products logistics system	Conference
5	Xin Zou, Mengqin Zhang, Huaitao Chen (2015)	Analysis on the Connotation of Green Logistics	Conference
6	Kai Zheng ; Yihong Ru ; Ruijing Wang ; Yu Zhu (2012)	Research on Model of Circular Construction Products Logistics System	Conference
7	Tuanying He (2012)	Tripartite strategy selection based on non-cooperative game theory for circular logistics system of automotive industry	Conference
8	ZHENG Guo-shen, LIAO Fu-lin, QI Xin-hua (2010)	Study on the Development Model of Industry Ecologicalization Based on Green Logistics	Journal
9	YANG Zhongzhi, SUN Haochen, (2011)	Value Law and Government Roles of Industrial Chains Formation in Recycling Economy	Journal
10	YUAN, YANG Xi-long, (2009)	Logistics Operation Based on Circulation Economy	Journal
11	Víctor-G. Aguilar-Escobar; Pedro Garrido-Vega; María-del-Mar González-Zamora, (2016)	Applying the theory of constraints to the logistics service of medical records of a hospital	Journal
12	Kee-hung Lai; Sarah J. Wu; Christina W. Y. Wong, (2013)	Did reverse logistics practices hit the triple bottom line of Chinese manufacturers?	Journal
13	YU Wen-wu, (2012)	Research on Constraints and Policy Recommendations of Development of Circular Logistics	Journal
14	WANG Gui-hua, (2010)	Study on the Operation Strategy of Circular Logistics Based on the Sustainable Development	Journal
15	LIU Zhao-jun; WANG Xiu-rong, (2013)	Research Automotive Loop Logistics System Based on Circular Economy	Journal
16	SONG Yu; RU Yi-hong; ZHENG Kai, (2010)	Research on Model of Construction Product Circular Logistics System: a Case Study of Earthwork	Journal
17	Wang Guihua, (2013)	Study on Mutual Influence and Synchronized Development of Circular Economy and Circular Logistics	Journal
18	ZHANG Zhongqiang, (2012)	Study on Technology Promotion and Construction of Circular Logistics System Based on Low Carbon Economy	Journal
19	Nicole van Buren, Marjolein Demmers, Rob van der Heijden, Frank Witlox, (2016)	Towards a Circular Economy: The Role of Dutch Logistics Industries and Governments	Journal
20	Liewn Zheng; Juan Zhang, (2010)	Research on Green Logistics System Based on Circular Economy	Journal
21	Jiang Ying; Zhou Li-jun, (2012)	Study on Green Supply Chain Management Based on Circular Economy	Journal
22	Blandine Laperche, Delphine Gallaud (2016)	Circular Economy, Industrial Ecology and Short Supply Chain	Book

Two major highlights with regards to logistics in the purview of CE are Reverse Logistics (Lai et al., 2013) and short supply chain (Gallaud & Laperche, 2016). While short supply chain implementation has so far been successful in the agricultural sector, its effective utilisation may not always be practically feasible for other industrial sectors, therefore businesses must focus their efforts to design effective reverse logistic system to collect any defected, used, and end of life products, to reverse them in circular system to be reutilised as raw material (Lai et al., 2013) or if not then to be disposed in a careful manner. Reverse Logistics not only plays a strategic role in implementation of CE, but it also is considered as strategic weapon and competitive advantage of good corporate citizenship (Chan & Chan, 2008).

4.1 Implementation strategies and sectors

Tuanying He (2012) discusses the circular logisitcs model for the automotive industry and suggests to develop a game theory model to monitor the establishment of ciruclar logisitcs. Rao Zhao (Zhao et al., 2015) utilises reverse logisitcs and proposes a multi-period, multicommodity and closed loop supply network for the automotive industry. Other researchers suggest the model of customer focused supply chain with end to end focus (Kuhn, 2015) and highlight the need for further research to develop frameworks for circular logistics in the automotive industry (Zhao-jun & Xiu-rong, 2013).

Another major focus of CE based on logistics systems is in the construction industry to make it resource saving and environment friendly by integrating the logistics of construction material and solid waste created (Zheng et al., 2012). A new model of CPCLS (Construction Product Circular Logistics System) was developed by mingling CE concept with Project Management to optimize resource utilisation and efficiency (Yu et al., 2010).

The current published literature listed in Table 1 is categorized and illustrated in Figure 4 with reference to articles discussing CE within the context of Logistics. Indeed it is a ground breaking effort to highlight the need and possibilities of further research for Circular Logistics, and it would not be correct to criticise the shallowness of the current published literature, except to the extent that further research is needed to explore its depth and to develop the roots of Circular Logistics in the current context.

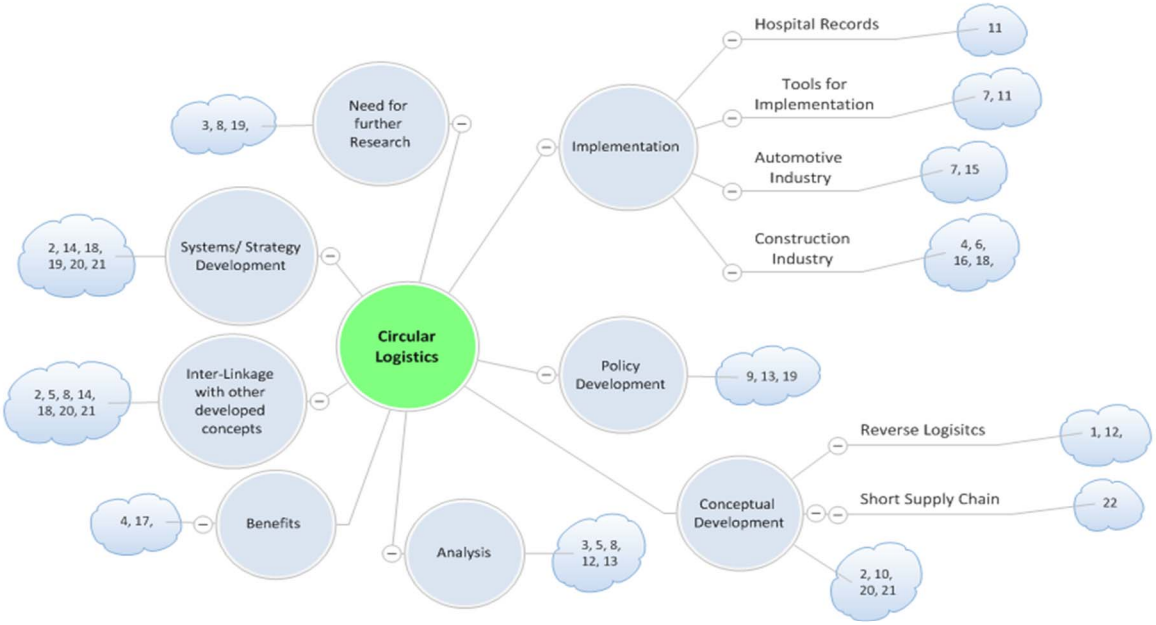

Figure 4: Dimensions explored in published literature on the topic of Circular Logistics

4.2 Barriers and Enablers of CE

While many organisations like Ellen McArthur Foundation (Ellen MacArthur Foundation, 2015), WRAP (WRAP, 2016), Circle Economy (Circle Economy, 2016), McKinsey and Company (McKinsey & Company, 2016), Capital Institute (Capital Institute, 2016), Zero Waste Scotland (Zero Waste Scotland, 2016), ARC21 (ARC21, 2016) are attempting to promote the implementation of CE, there are some barriers/challenges to such implementation. In the context of China, Geng & Doberstein, (2010) describes three barriers/challenges as: Policy, Technology, and Public Participation. Dutch researchers further add more aspects which can be considered as sub-aspects of the earlier mentioned barriers: Institutional Barriers, Economic Barriers, Social and People-related barriers, and profesisonal barriers (Buren et al., 2016).

In one form or another, these weaknesses/barriers in the implementation of CE are in fact drivers, so once strengthened the implementation of CE would be enhanced. The three barrier mentioned above – Policy, Technology, and Public participation; are key aspects for the succesful implementation of CE (Buren et al., 2016). Within the context of China, scholars analyse the Logistics sector in the light of CE and highlight the need for policy development as a key to implement CE in the Logistics sector (Gui-hua, 2010) (Wen-wu, 2012), and information system and technology to enable the realistic development of Circular Logistics (Gui-hua, 2010) (Zhongqiang, 2012).

As Webster (2013) defines it in the words of Buckminister Fuller, that *"You never change things by fighting against the existing reality. To change something, build a new model that makes the old model obsolete"*. A complete redesign of logisitcs system is necessary for its alignment with CE. By redesign the authors do not intend to point at resdesigning the structural framework – although that too is coming with the devleopment of technology (e.g self-driven and energy efficient vehicles); but the necessity of thought pattern, policy development and integrated approach while planning and designing the CE implementation.

5. Conclusions

Circular Economy has massive potential and is a budding solution to the present day challenges of fast resource depletion, effective and efficient utilisation of resources, and waste management. In its broad spectrum, every dimension of business needs careful analysis for effective implementation of CE. One of the major dimensions of business is 'Logistics'. At present, the amount and depth of research for CE's implementation in Logistics sector is minimal and shallow, but is a good ground breaking effort to further instigate research and exploration of possible developments. This paper has presented the knowledge about Circular Economy in broader spectrum, based on up-to date published literature and has further explored the published literature with CE's implementation in Logistics sector. The scholarly contribution is acknowledged without any criticism as these papers are the first ones to explore the dimension of logistics from this prospective. Authors strongly believe that more research is needed to gird the logistics sector as one of the main contributor in establishing Circular Economy, globally.

References

Aguilar-Escobar, V. G., Garrido-Vega, P. & González-Zamora, M.-d.-M., 2016. Applying the theory of constraints to the logistics service of medical records of a hospital. *European Research on Management and Business Economics,* 22, pp. 139-146.

Anderson, M. S., 2007. An Introductory note on the environmental economics of the circular economy. *Sustainability Science ,* 2(1), pp. 133-140.

ARC21, 2016. [Online] Available at: http://www.arc21.org.uk/ [Accessed 06 05 2016].

Bartl, A., 2015. Withdrawal of the circular economy package: A wasted opportunity or a new challenge?. *Waste Management,* 44, pp. 1-2.

BBC, 2016. *Inside Business: Recycling group ARC21 calls for 'circular economy'.* [Online] Available at: http://www.bbc.co.uk/news/uk-northern-ireland-37396892 [Accessed 20 09 2016].

Bilitewski, B., 2012. The Circular Economy and its Risks. *Waste Management ,* 32, pp. 1-2.

Boulding, K. E., 1966. The Economics of the Coming Spaceship Earth, in: Jarret, H (Ed.). *Environmental Economy in a Growing Economy ,* pp. 3-14.

Braungart, W. M. a. M., 2002. *Cradle to Cradle.* New York: North Point Press.

Buren, N. v., Demmers, M., Heijden, R. v. d. & Witlox, F., 2016. Towards a Circular Economy: The Role of Dutch Logistics Industries and Governments. *Sustainability.*

Capital Institute, 2016. [Online] Available at: http://capitalinstitute.org/ [Accessed 15 09 2016].

Chan, F. T. S. & Chan, H. K., 2008. A survey on reverse logistics system of mobile phone industry in Hong Kong. *Managemet Decision,* 46(5), pp. 702-708.

Chun-rong, J. & Jun, Z., 2011. Evaluation of Regional Circular Economy Based on Matter Element Analysis. *Procedia Environmental Sciences,* 11, pp. 637-642.

Circle Ecomony, Aug. 2016. *On the Road to the Circular Car,* Amsterdam: Circle Economy.

Circle Economy, 2016. *About the Circular Economy.* [Online] Available at: http://circle-economy.com/circular-economy/

Circle Economy, 2016. *Circle Economy: Practical, scalable, implementation of the circular economy.* [Online] Available at: http://www.circle-economy.com/ [Accessed 28 08 2016].

Despeisse, M., Kishita, Y., Nakano, M. & Barwood, M., 2015. Towards a circular economy for end-of-life vehicles: A comparative study UK – Japan. *Procedia CIRP,* 29, pp. 668-673.

Duan, N. et al., 2011. Study on the effect of biogas project on the development of low-carbon circular economy - A case study of Beilangzhong eco-village. *Prcoedia Environmental Sciences ,* 5, pp. 160-166.

Ellen Macarthur Foundation, 2015. *CE100.* [Online] Available at: https://www.ellenmacarthurfoundation.org/ce100 [Accessed 15 09 2016].

Ellen MacArthur Foundation, 2015. *Delivering the Circular Economy – A Toolkit for Policymakers,* Isle of Wight: Ellen MacArthur Foundation.

Ellen Macarthur Foundation, 2015. *Growth Within: A Circular Economy Vision for a Competitive Europe,* UK: Ellen Macarthur Foundation.

Ellen Macarthur Foundation, 2015. *Schools of Thought.* [Online] Available at: https://www.ellenmacarthurfoundation.org/circular-economy/schools-of-thought/cradle2cradle [Accessed 23 11 2016].

Ellen Macarthur Foundation, 2016. *Building Blocks of a Circular Economy.* [Online] Available at: http://www.ellenmacarthurfoundation.org/circular-economy/building-blocks

European Commission, 2015. *Eco-innovation in Poland,* Poland: The Eco Innovation Observatory.

Gabriela-Cornelia, P., Iudith, I. & Alexandru , B., 2015. New Theoretical And Practical Approaches Of Implementing The Circular Economy For The Preservation Of Natural Resources. *Procedia Economics and Finance,* 22, pp. 124-130.

Gallaud, D. & Laperche, B., 2016. *Circular Economy, Industiral Ecology and Short Supply Chain.* London: ISTE.

Garza-Reyes, J. A., 2015. Lean and green - a systematic review of the state of the art literature. *Journal of Cleaner Production,* 102, pp. 18-29.

Geng, Y. & Doberstein, B., 2010. Developing the Circular Economy in China: Challenges and Opportunities for achienving 'leapfrog development'. *International Journal of Sustainable Development and World Ecology,* pp. 231-239.

Geng, Y., Fu, J., Sarkis, J. & Xue, B., 2012. Towards a national circular economy indicator system in China: an evaluation and critical analysis. *Journal of Cleaner Production,* 23, pp. 216-224.

Geng, Y., Zhu, Q., Doberstein, B. & Fujita, T., 2009. Implementing China's circular economy concept at the regional level: A review of progress in Dalian, China. *Waste Management,* 29, pp. 996-1002.

Genovesa, A., Acquaya, A. A., Figueroa, A. & Koh, S. L., 2017. Sustainable supply chain management and the transition towards a circular economy: Evidence and some applications. *Omega,* 66, pp. 344-357.

George, D. A. R., Lin, B. C.-a. & Chen, Y., 2015. A Circular Economy model of economic growth. *Environmental Modelling & Software,* 73, pp. 60-63.

Ghisellini, P., Cialani, C. & Ulgiati, S., 2016. A review on circular economy: the expected transition to a balanced interplay of environmental and economic systems. *Journal of Cleaner Production ,* 114, pp. 11-32.

Gregson, N., Crang, M., Fuller, S. & Holmes, H., 2015. Interrogating the Circular Economy: the moral economy of resource recovery in the EU. *Economy and Society,* pp. 218-243.

Greyson, J., 2015. *A Glance at Waste-Free Economy.* [Online] Available at: http://www.ecomena.org/tag/linear-economy/

Gui-hua, W., 2010. Study on the Operation Strategy of Circular Logistics Based on the Sustainable Development. *Journal of Jiangsu Vocational and Technical Institute of Economics and Commerce.*

Guihua, W., 2013. Study on Mutual Influence and Synchronized Development of Circular Economy and Circular Logistics. *Logistics Technology.*

Guo-gang, J., 2011. Empirical Analysis of Regional Circular Economy Development--Study Based on Jiangsu, Heilongjiang, Qinghai Province. *Energy Procedia ,* 5, pp. 125-129.

Guohui, S. & Yunfeng, L., 2012. The Effect of Reinforcing the Concept of Circular Economy in West China Environmental Protection and Economic Development. *Prcoedia Environmental Sciences ,* 12, pp. 785-792.

Guo-shen, Z., Fu-lin, L. & Xin-hua, Q., 2010. Study on the Development Model of Industry Ecologicalization Based on Green Logistics. *China Forestry Economy.*

He, T., 2012. *Tripartite strategy selection based on non-cooperative game theory for circular logistics system of automotive industry.* Taiyuan, China, IEEE.

He, T., 2012. *Tripartite strategy selection based on non-cooperative game theory for circular logistics system of automotive industry.* s.l., IEEE.

Hu, J. et al., 2011. Ecological utilization of leather tannery waste with circular economy model. *Journal of Cleaner Production ,* 19, pp. 221-228.

Jawahir, I. & Bradley, R., 2016. Technological Elements of Circular Economy and the Principles of 6R-Based Closed-loop Material Flow in Sustainable Manufacturing. *Prcoedia CIRP,* 40, pp. 103-108.

Jian, Z. & Kun, H., 2011. Research on Early-Warning Method and its Application of Complex System of Circular Economy for Oil and Gas Exploitation. *Energy Procedia,* 5, pp. 2040-2047.

Jiao, W. & Boons, F., 2015. Policy durability of Circular Economy in China: A process analysis of policy translation. *Resource Conservation and Recycling.*

Jowit, J., 2008. *Climate Change.* [Online] Available at: http://www.theguardian.com/environment/2008/oct/29/climatechange-endangeredhabitats [Accessed 03 04 2016].

Jun, H. & Xiang, H., 2011. Development of Circular Economy Is A Fundamental Way to Achieve Agriculture Sustainable Development in China. *Energy Procedia,* 5, pp. 1530-1534.

Junjie, C., Ming, L. & Shuguo, L., 2011. Development Strategy Research of Modern Eco-Agriculture on the basis of constructing the Rural Circular Economy-For the Example of Shandong Province. *Energy Procedia,* 5, pp. 2504-2508.

Kai, Z., Ruijiang, W. & Yihong, R., 2010. *Analysis on economic and environmental benefits of circular construction products logistics system.* Wuhan, China, IEEE.

Kai, Z., Ruijiang, W. & Yihong, R., 2010. *Analysis on economic and environmental benefits of circular construction products logistics system.* s.l., IEEE.

Kuhn, J., 2015. *End-to-end supply chains: The solution?.* s.l., IEEE.

Kun, H. & Jian, Z., 2011. Circular Economy Strategies of oil and Gas exploitation in China. *Energy Procedia,* 5, pp. 2189-2194.

Kurilova-Palisaitiene, J., Lindkvist, L. & Sundin, E., 2015. Towards facilitating circular product life-cycle information flow via remanufacturing. *Procedia CIRP,* 29, pp. 780-785.

Lacy, P. & Rutqvist, J., 2015. *Waste to Wealth.* Hampshire, UK: Palgrave Macmillan.

Lai, K.-h., Wu, S. J. & Wong, C. W., 2013. Did reverse logistics practices hit the triple bottom line of Chinese manufacturers?. *International Journal of Production Economics,* 146, pp. 106-117.

Landaburu-Aguirre, J. et al., 2016. Fouling prevention, preparing for re-use and membrane recycling. Towards circular economy in RO desalination. *Desalination,* 393, pp. 16-30.

Lee, J., Pedersen, A. B. & Thomsen, M., 2014. Are the resource strategies for sustainable development sustainable? Downside of a zero waste society with circular resource flows. *Environmental Technology & Innovation,* pp. 46-54.

Liang, H., Li, B., Tao, S. & Lian-jun, T., 2006. Circular Economy Models of Animal Husbandry Indstry in Jilin Province. *Chinese Geographic Science ,* 16(2), pp. 148-153.

Lieder, M. & Rashid, A., 2016. Towards circular economy implementation: a comprehensive review in context of manufacturing industry. *Jounral of Cleaner Production,* 115, pp. 36-51.

Liguori, R. & Faraco, V., 2016. Biological processes for advancing lignocellulosic waste biorefinery by advocating circular economy. *Bioresource Technology,* 215, pp. 13-20.

Li, H. et al., 2010. Energy conservation and circular economy in China's process industries. *Energy,* 35, pp. 4273-7281.

Lihong, W. & Hui, Z., 2011. Development of circular economy and optimization of industrial structure for Shandong Province. *Energy Procedia,* 5, pp. 1603-1610.

Liker, J. K., 2004. *The Toyota Way: 14 Management Principles from the World's Greatest Manufacturer.* USA: McGraw-Hill Publication .

Li, N., Zhang, T. & Liang, S., 2013. Reutilisation-extended material flows and circular economy in China. *Waste Management ,* 33, pp. 1552-1560.

Li, R. & Su, C., 2012. Evaluation of the circular economy development level of Chinese chemical enterprises. *Procedia Enviornmental Sciences ,* 13, pp. 1595-1601.

Li, S., 2012. The Research on Quantitative Evaluation of Circular Economy Based on Waste Input-Output Analysis. *Prcoedia Environmental Sciences,* 12, pp. 65-71.

Liu, D., Li, H., Wang, W. & Dong, Y., 2012. Constructivism scenario evolutionary analysis of zero emission regional planning: A case of Qaidam Circular Economy Pilot Area in China. *International Journal of Prdocution Economics ,* 140, pp. 341-356.

Liu, J. Y.-S., 2012. Circular Economy and Environmental Efficiency –The Case of Traditional Hakka Living System. 57, pp. 255-260.

Liu, Q. et al., 2009. A survey and analysis on public awareness and performance for promoting circular economy in China: A case study from Tianjin. *Journal of Cleaner Production ,* 17, pp. 265-270.

Liu, Y. & Bai, Y., 2014. An exploration of firms' awareness and behavior of developing circular economy: An empirical research in China. *Resource Conservation and Recycling,* 87, pp. 145-152.

Li, Y. & Ma, C., 2015. Circular economy of a papermaking park in China: a case study. *Journal of Cleaner Production ,* 92, pp. 65-74.

Ma, S.-h., Wen, Z.-g., Chen, J.-n. & Wen, Z.-c., 2014. Mode of circular economy in China's iron and steel industry: a case study in Wu'an city. *Journal of Cleaner Production,* 64, pp. 505-512.

McKinnon, A., Cullinane, S., Browne, M. & Whiteing, A., 2010. *Green Logistics.* UK: Kogan Page.

McKinsey & Company, 2016. *Moving toward a circular economy.* [Online] Available at: http://www.mckinsey.com/business-functions/sustainability-and-resource-productivity/our-insights/moving-toward-a-circular-economy [Accessed 12 09 2016].

Ministry of Economy, Trade and Industry, 2004. *Handbook on Resource Recycling Legislation and Trends in 3R.* Tokyo: Recycling Plomotion Divions .

Murray, A., Skene, K. & Haynes, K., 2015. The Circular Economy: An Interdisciplinary Exploration of the Concept and Application in a Global Context. *Journal of Business Ethics.*

Naustdalslid, J., 2014. Circular economy in China – the environmental dimension of the harmonious society. *International Journal of Sustainable Development & World Ecology,* 21(4), pp. 303-313.

Pan, S.-Y.et al., 2015. Strategies on implementation of waste-to-energy (WTE) supply chain for circular economy system: a review. *Journal of Cleaner Production ,* 108, pp. 409-421.

Papadopoulos, D. & Tsianos, V. S., 2013. After citizenship: autonomy of migration, organisational ontology and mobile commons. *Citizenship Studies.*

Park, J., Sarkis, J. & Wu, Z., 2010. Creating integrated business and environmental value within the context of China's Curcular Economy and Ecological Modernization. 18, pp. 1494-1501.

Pearce, D. W. & Turner, R. K., 1989. *Economics of Natural Resources and the Environment.* London: Harvester Wheatsheaf.

Ping, G., 2011. Information Management System with the Application to Tourism Management in the Period of circular economy. *Energy Procedia,* 5, pp. 1525-1529.

Pin, X. & Hutao, Y., 2007. Re-reading Steady-state Economy: Calm Thinking on Hot Circular Economy. *Chine Population, Resource and Environment,* 17(3), pp. 20-23.

Qing, Y., Mingyue, C. & Qiongqiong, G., 2011. Research on the Circular Economy in West China. *Energy Procedia,* 5, pp. 1425-1432.

Qing, Y., Qiongqiong, G. & Mingyue, C., 2011. Study and Integrative Evaluation on the development of Circular Economy of Shaanxi Province. *Energy Procedia,* 5, pp. 1568-1578.

Qiping, R., 2011. Circular Economy Action Programs and Countermeasures for Small and Medium-sized Resource-based Cities of China - Case Study of Zibo City of Shandong Province. *Energy Procedia,* 5, pp. 2183-2188.

Reh, L., 2013. Process engineering in circular economy. *Particuology,* 11, pp. 119-133.

Romero, D. & Noran, O., 2015. *Green Virtual Enterprises and their Breeding Environments: Engineering their Sustainability as Systems of Systems for the Circular Economy.* s.l., Elsevier, pp. 2258-2265.

Rong, Z., 2014. *Study on the Sustainable Development of Logistics for Circulation Economy.* s.l., Atlantis Press.

Ru-yin, L. & Xiao-ting, Z., 2009. Negative entropy mechanism of the circular economy development countermeasures in mining area. *Procedia Earth and Planetary Science,* 1, pp. 1678-1685.

Sauve, S., Bernard, S. & Sloan, P., 2016. Environmental sciences, sustainable development and circular economy: Alternative concepts for trans-disciplinary research. *Environmental Development,* 17, pp. 48-56.

Scharff, H., 2014. Landfill reduction experience in The Netherlands. *Waste Management ,* 34, pp. 2218-2224.

Scheepens, A., Vogtlander, J. & Brezet, J., 2016. Two life cycle assessment (LCA) based methods to analyse and design complex (regional) circular economy systems. Case: making water tourism more sustainable. *Journal of Cleaner Production,* 114, pp. 257-268.

Schulte, U. G., 2013. New Business models for a radical change in resource efficieny. *Environmental Innovation and Societal Transitions ,* pp. 43-47.

Shen, X. & Qi, C., 2012. Countermeasures towards Circular Economy Development in West Regions. *Energy Procedia,* 16, pp. 927-932.

Singh, J. & Ordonez, I., 2015. Resource recovery from post-consumer waste: important lessons for the upcoming circular economy. *Journal of Cleaner Production,* 134, pp. 342-353.

Smol, M. et al., 2015. The possible use of sewage sludge ash (SSA) in the construction industry as a way towards a circular economy. *Journal of Cleaner Production,* 95, pp. 45-54.

Strazza, C., Magrassi, F., Gallo, M. & Borghi, D., 2015. Life Cycle Assessment from food to food: A case study of circular economy from cruise ships to aquaculture. *Sustainable Production and Consumption,* 2, pp. 40-51.

Su, B., Heshmati, A., Geng, Y. & Yu, X., 2013. A review of the circular economy in China: moving from rhetoric to implementaiton. *Journal fo Cleaner Production ,* 42, pp. 215-227.

Taiwan News, 2011. *Global overproduction will hinder plastics industry growth.* [Online] Available at: http://taiwannews.com.tw/etn/news_content.php?id=1759566

The Danish Government, 2013. *Denmark without waste,* Denmark: The Danish Government.

The Guardian, 2014. *Five countries moving ahead of the pack on circular economy legislation.* [Online] Available at: https://www.theguardian.com/sustainable-business/2014/oct/29/countries-eu-circular-economy-legislation-denmark-sweden-scotland [Accessed 4 8 2016].

Thomas Goldsby, R. M., 2005. *Lean Six Sigma Logistics.* USA: J. Ross Publishing.

Tong, X. & Tao, D., 2016. The rise and fall of a "waste city" in the construction of an "urban circular economic system": The changing landscape of waste in Beijing. *Resources, Conservation and Recycling ,* 107, pp. 10-17.

Tukker, A., 2015. Product services for a resource-efficient and circular economy - a review. *Journal of Cleaner Production,* 97, pp. 76-91.

Velis, C. A., 2015. Circular Economy and global secondary material supply chains. *Waste Management & Research,* pp. 389-391.

Webster, K., 2013. What Might We Say about a Circular Economy? Some Temptations to Avoid if Possible. *World Futures: The Journal of Global Education ,* 69(7-8), pp. 542-554.

Webster, K., 2015. *The Circular Economy A Wealth of Flows.* UK: Ellen MacArthur Foundation Publishing.

Weelden, E. v., Mugge, R. & Bakker, C., 2016. Paving the way towards circular consumption: exploring consumer acceptance of refurbished mobile phones in the Dutch market. *Journal of Cleaner Production,* 113, pp. 743-754.

Wenbo, L., 2011. Comprehensive evaluation research on circular economic performance of eco-industrial parks. *Energy Procedia,* 5, pp. 1682-1688.

Wen-wu, Y., 2012. Research on Constraints and Policy Recommendations of Development of Circular Logistics. *Journal of Harbin University of Commerce(Social Science Edition).*

WRAP, 2016. *At the forefront of the Circular Economy.* [Online] Available at: http://www.wrap.org.uk/ [Accessed 05 09 2016].

Wu, H.-q., Shi, Y., Xia, Q. & Zhu, W.-d., 2014. Effectiveness of the policy of circular economy in China: A DEA-based analysis for the period of 11th five-year-plan. *Resource, Conservation and Recycling ,* 83, pp. 163-175.

Xi, H., 2011. Models of Circular Economy on Agriculture in Yunnan Province. *Energy Procedia,* 5, pp. 1078-1083.

Xinan, L. & Yanfu, L., 2011. Driving Forces on China's Circular Economy: From Government's perspectives. *Energy Prcoedia,* 5, pp. 297-301.

Xiong, P., Dang, Y. & Qian, W., 2011. The Empirical Analysis of Circular Economy Development Efficiency in Jiangsu Province. *Energy Procedia,* 5, pp. 1732-1736.

Xuan, L., Baotong, D. & Hua, Y., 2011. The Research Based on the 3-R Principle of Agro-circular Economy Model-The Erhai Lake Basin as an Example. *Energy Prcoedia,* 5, pp. 1399-1404.

Xue, B. et al., 2010. Survey of officials' awareness on circular economy development in China: Based on municipal and county level. *Resource, Conservation and Recycling ,* 54, pp. 1296-1302.

Xu, J., Li, X. & Wu, D. D., 2009. Optimizing Circular Economy Planning and Risk Analysis Using System Dynamics. *Human and Ecological Risk Assessment: An International Journal,* 15(2), pp. 316-331.

Ying, J. & Li-jun, Z., 2012. Study on Green Supply Chain Management Based on Circular Economy. *Energy Procedia,* 25, pp. 1682-1688.

Yuan, Y. & Xi-long, Y., 2009. Logistics Operation Based on Circulation Economy. *Environmental Protection of Xinjiang.*

Yuan, Z., Bi , J. & Moriguichi, Y., 2006. The Circular Economy: A New Development Strategy in China. *Jounral of Industrial Ecology,* 10(1-2), pp. 4-8.

Yu, S., Yi-hong, R. & Kai, Z., 2010. Research on Model of Construction Product Circular Logistics System:a Case Study of Earthwork. *Logistics Technology.*

Zabaniotou, A., Rovas, D., Libutti, A. & Monteleone, M., 2015. Boosting circular economy and closing the loop in agriculture: Case study of a small-scale pyrolysis–biochar based system integrated in an olive farm in symbiosis with an olive mill. *Environmental Development,* 14, pp. 22-36.

Zeng, S.-l. & Zhang, H.-l., 2011. Promoting low-carbon development of electric power industry in China: A circular economy efficiency perspective. *Energy Procedia,* 5, pp. 2540-2548.

Zero Waste Scotland, 2016. *Zero Waste Scotland.* [Online] Available at: http://www.zerowastescotland.org.uk/ [Accessed 23 08 2016].

Zhao-jun, L. & Xiu-rong, W., 2013. Research Automotive Loop Logistics System Based on Circular Economy. *Logistics Sci-Tech.*

Zhao, R., Hu, D.-w. & Zhu, L., 2015. *Design of Supply Chains with Integration of Reverse Logistics of Automobile Parts.* s.l., American Society of Civil Engineers.

Zhao, Y., Zang, L., Li, Z. & Qin, J., 2012. Discussion on the Model of Mining Circular Economy. *Energy Procedia,* 16, pp. 438-443.

Zheng, K., Ru, Y., Wang, R. & Zhu, Y., 2012. *Research on Model of Circular Construction Products Logistics System.* s.l., American Society of Civil Engineers.

Zheng, L. & Zhang, J., 2010. Research on Green Logistics System Based on Circular Economy. *Asian Social Science,* 6(11), pp. 116-119.

Zhijun, F. & Nailing, Y., 2007. Putting a circular economy into practice in China. *Sustainability Science,* 2(1), pp. 95-101.

Zhilei, Y. & Wei, W., 2011. The Research on Pricing Strategy for Perishable High-tech Products Based on Circular Economy. *Energy Procedia,* 5, pp. 1842-1846.

Zhongqiang, Z., 2012. Study on Technology Promotion and Construction of Circular Logistics System Based on Low Carbon Economy. *Science and Technology Management Research.*

Zhongzhi, Y. & Haochen, S., 2011. Value Law and Government Roles of Industrial Chains Formation in Recycling Economy. *Ecological Economy.*

Zhou, K. et al., 2014. *A Study on Circular Economy Implementation in China.* Paris: IPAG Business School.
Zhu, Q., Geng, Y. & Lai, K.-h., 2010. Circular economy practices among Chinese manufacturers varying in environmental-oriented supply chain cooperation and the performance implications. *Jounral of Environmental Management,* 91, pp. 1324-1331.
Zou, X., Zhang, M. & Chen, H., 2015. *Analysis on the Connotation of Green Logistics.* s.l., Atlantis Press.

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