Assessing the Role of Big Data and the Internet of Things on the Transition to Circular Economy: Supplementary Information

An extension of the ReSOLVE framework proposal through a literature review

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Appendix 1

Table S1: Top publications by source (scientific journals with more than 1 publication)

Source	#of publications
Journal of Cleaner Production	19
Sustainability (Switzerland)	9
Sustainable Cities and Society	6
IEEE Internet of Things Journal	5
Technological Forecasting & Social Change	5
Renewable & Sustainable Energy Reviews	4
Resources, Conservation and Recycling	2
Critical Reviews in Environmental Science and Technology	2
Energy and Buildings	2
Sensors (Switzerland)	2
International Journal of Sustainable Development and World Ecology	2
IEEE Systems Journal	2
IEEE Communications Magazine	2
International Journal of Production Research	2
Waste Management	2
Other Scientific Journals	54
Other source types (conference or proceedings papers, book chapters)	106
TOTAL	226

Table S2: Publishing Institutions[1]

Institute	Country	# Pubs
Norwegian University of Science and Technology	Norway	6
Montpellier Business School	France	4
Northwestern Polytechnical University Shaanxi	China	4
Politecnico di Milano	Italy	4
Auckland University of Technology	New Zealand	3
Beihang University	China	3
Chinese Academy of Sciences	China	3
Royal Institute of Technology	Sweden	3
Aalto University	Finland	2
Cardiff University	UK	2
Centre for Research and Technology Hellas	Greece	2
COMSATS Inst Informat Technol	Pakistan	2
Duke Energy	USA	2
Häme University of Applied Sciences	Finland	2
Huazhong University of Science and Technology	China	2
Inria	France	2
Kyung Hee University	South Korea	2
Politecnico di Torino	Italy	2
Singapore Institute of Manufacturing Technology	Singapore	2
Tianjin University	China	2
Tsinghua University	China	2
UCLA	USA	2
Universidad de Chile	Chile	2
Universiti Teknologi Malaysia	Malaysia	2
University of Brescia	Italy	2
University Politehnica of Bucharest	Romania	2
National Institute of Industrial Engineering	India	2
Other Institutes		158
TOTAL		226

[1] Institutuions with two or more publications listed

Table S3: Top Journal Articles on Circular Economy with the use of Big Data or IoT ordered by year / author [2]

Year / Author	Published in	Paper Type	Ref
2015 Schuelke-Leech et al.	Renewable & Sustainable Energy Reviews	Review	(1)
2016 Hu and Vasilakos	IEEE Transactions on Smart Grid	Review	(2)
2017 Ahmed et al.	Scientific Reports	Model	(3)
2017 AlFaris et al.	Energy and Buildings	Review	(4)
2017 Aste et al.	Renewable & Sustainable Energy Reviews	Model	(5)
2017 Hazen et al.	Journal of Cleaner Production	Review	(6)
2017 Howell et al.	Renewable & Sustainable Energy Reviews	Review	(7)
2017 Ifaei et al.	Energy Conversion and Management	Case	(8)
2017 Ji et al.	Journal of Cleaner Production	Model	(9)
2016 Li et al.	Journal of Cleaner Production	Case	(10)
2017 Louhghalam et al.	Journal of Cleaner Production	Model	(11)
2017 Seo et al.	Sensors (Switzerland)	Model	(12)
2017 Shrouf et al.	Journal of Cleaner Production	Case	(13)
2017 Spring and Araujo	Industrial Marketing Management	Review	(14)
2017 Xia et al.	Journal of Cleaner Production	Model	(15)
2017 Zhang and Chen	Journal of Cleaner Production	Case	(16)
2017 Yingfeng Zhang et al.	Journal of Cleaner Production	Model	(17)
2017 Y. Zhang et al.	Journal of Cleaner Production	Model	(18)
2017 Zhang and Huisingh 20	Journal of Cleaner Production	Review	(19)
2018 Brundage et al.	Journal of Cleaner Production	Review	(20)
2018 Choi et al.	IEEE Communications Magazine	Model	(21)
2018 Deakin and Reid	Journal of Cleaner Production	Review	(22)
2018 Dubey et al.	Journal of Cleaner Production	Survey	(23)
2018 Y. Guo et al.	International Journal of Production Research	Model	(24)
2018 Z. Guo et al.	Renewable & Sustainable Energy Reviews	Review	(25)
2018 Ifaei et al.	Energy	Case	(26)
2018 Jatinkumar Shah et al.	Waste Management	Model	(27)
2018 Jiao et al.	Journal of Cleaner Production	Model	(28)

[2] Only articles from journals with Scimago 100 or higher.
Articles from 2019: available online since 2018

Year / Author	Published in	Paper Type	Ref
2018 Kuo and Smith	Journal of Cleaner Production	Review	(29)
2018 Kusiak	Int. Jr. of Production Research	Review	(30)
2018 Li et al.	IEEE Communications Magazine	Model	(31)
2018 Lu et al.	Waste Management	Review	(32)
2018 Manavalan and Jayakri	Computers and industrial Engineering	Model	(33)
2018 Olszewski et al.	Sensors (Switzerland)	Case	(34)
2018 Singh et al.	Journal of Cleaner Production	Model	(35)
2018 Zhang et al.	Journal of Cleaner Production	Model	(36)
2018 Zhang et al.	Journal of Cleaner Production	Model	(37)
2018 Zou et al.	Energy and Buildings	Review	(38)
2019 Xue et al.	Journal of Cleaner Production	Case	(39)

Appendix 2

Participating domain experts consulted during capabilities validation phase:

Domain Expert Name	Title	Institution
Beatriz Luz	CEO and Founder	Exchange 4 Change Brasil http://e4cb.com.br/
Juliana Aguiar	PhD – Education, Management and Diffusion in Biosciences CEO and Founder	UFRJ – Federal University of Rio de Janeiro https://ufrj.br/ Rede de Pesquisadores https://www.rededepesquisadores.org/
Juliana Velloso Durão	PhD – Public policy, strategy and development	UFRJ – Federal University of Rio de Janeiro https://ufrj.br/
Nathália Geronazzo Franco	Petrochemicals and biofuels supply analyst	IBP - Brazilian Petroleum, Gas and Biofuels Institute https://www.ibp.org.br/?lang=en

Domain Expert Name	Title	Institution
Nathália Revoredo	Sustainability solutions strategist	Independent Consultant
Priscila Rodrigues Gomes	PhD – Environmental Engineering	Universidade Positivo https://www.up.edu.br/blogs/english/
Raísa Ayres Moesch	Researcher	UFRGS – Federal University of Rio Grande do Sul http://www.ufrgs.br/english/home
Victoria Santos	PhD – Energetic and Environmental Planning Researcher	Senai / Cetiqt https://senaicetiqt.com/

Appendix 3

Grey literature used in the research

Source	Description
Ellen MacArthur Foundation	Launched in 2010 to accelerate the transition to a CE, being a global thought leader, establishing the CE on the agenda of decision makers across business, government and academia, with the support of strategic philanthropic partners (40)
International Organization for Standardization (ISO)	Worldwide federation of national standards bodies. For this research, we are referring to ISO 20400 – guidance standard that helps any type of organization implement sustainable procurement (41)
World Commission on Environment and Development (WCED)	The UN's World Commission for Environment and Development, chaired by former Norwegian Prime Minister Gro Harlem Brundtland and thus referred to as the Brundtland Commission, published the report "Our Common Future," also known as the "Brundtland Report" in 1987 (42)
World Economic Forum (WEF)	Since 1971 WEF, the International Organization for Public-Private Cooperation, has been engaging the foremost political, business and other leaders of society to shape global, regional and industry agendas (43)

Appendices 1–3: References

1. B.-A. . Schuelke-Leech, B. . Barry, M. . Muratori and B. J. . Yurkovich, *Renew. Sustain. Energy Rev.*, 2015, **52**, 937 LINK https://doi.org/10.1016/j.rser.2015.07.128
2. J. Hu and A. V. Vasilakos, *IEEE Trans. Smart Grid*, 2016, **7**, (5), 2432 LINK https://doi.org/10.1109/TSG.2016.2563461
3. A. Ahmed, I. Hassan, P. Song, M. Gamaleldin, A. Radhi, N. Panwar, S. C. S. C. S. C. Tjin, A. Y. A. Y. Desoky, D. Sinton, K.-T. K.-T. K.-T. Yong and J. Zu, *Sci. Rep.*, 2017, **7**, (1), LINK https://doi.org/10.1038/s41598-017-17453-4
4. F. AlFaris, A. Juaidi and F. Manzano-Agugliaro, *Energy Build.*, 2017, **153**, 262 LINK https://doi.org/10.1016/j.enbuild.2017.07.089
5. N. Aste, M. Manfren and G. Marenzi, *Renew. Sustain. Energy Rev.*, 2017, **75**, (September 2015), 313 LINK https://doi.org/10.1016/j.rser.2016.10.072
6. B. T. Hazen, C. A. Boone, Y. Wang and K. S. Khor, *J. Clean. Prod.*, 2017, **142**, (2, SI), 716 LINK https://doi.org/10.1016/j.jclepro.2016.05.099
7. S. Howell, Y. Rezgui, J.-L. L. Hippolyte, B. Jayan and H. Li, *Renew. Sustain. ENERGY Rev.*, 2017, **77**, (January), 193 LINK https://doi.org/10.1016/j.rser.2017.03.107
8. P. Ifaei, A. R. Karbassi, S. Lee and C. Yoo, *ENERGY Convers. Manag.*, 2017, **153**, 257 LINK https://doi.org/10.1016/j.enconman.2017.10.014
9. X. Ji, J. Sun, Y. Wang and Q. Yuan, *J. Clean. Prod.*, 2017, **142**, (2, SI), 894 LINK https://doi.org/10.1016/j.jclepro.2016.02.117
10. L. Li, T. Hao and T. Chi, *J. Clean. Prod.*, 2016, **142**, 513 LINK https://doi.org/10.1016/j.jclepro.2016.02.078
11. A. Louhghalam, M. Akbarian and F.-J. J. Ulm, *J. Clean. Prod.*, 2017, **142**, (2, SI), 956 LINK https://doi.org/10.1016/j.jclepro.2016.06.198
12. A. Seo, J. Jeong and Y. Kim, *Sensors*, 2017, **17**, (8), 1868 LINK https://doi.org/10.3390/s17081868
13. F. Shrouf, B. Gong, J. Ordieres-Meré and J. Ordieres-Mere, *J. Clean. Prod.*, 2017, **142**, (4), 2570 LINK https://doi.org/10.1016/j.jclepro.2016.11.019
14. M. Spring and L. Araujo, *Ind. Mark. Manag.*, 2017, **60**, 126 LINK https://doi.org/10.1016/j.indmarman.2016.07.001
15. D. Xia, Q. Yu, Q. Gao and G. Cheng, *J. Clean. Prod.*, 2017, **141**, 1337 LINK https://doi.org/10.1016/j.jclepro.2016.09.083
16. N. Zhang and Z. Chen, *J. Clean. Prod.*, 2017, **142**, (2, SI), 642 LINK https://doi.org/10.1016/j.jclepro.2016.02.052
17. Y. Zhang, S. Ren, Y. Liu, T. Sakao and D. Huisingh, *J. Clean. Prod.*, 2017, **159**, 229 LINK https://doi.org/10.1016/j.jclepro.2017.04.172
18. Y. Zhang, S. Ren, Y. Liu and S. Si, *J. Clean. Prod.*, 2017, **142**, 626 LINK

https://doi.org/10.1016/j.jclepro.2016.07.123

19. Z. Zhang and D. Huisingh, *J. Clean. Prod.*, 2017, **142**, (2, SI), 1055 LINK https://doi.org/10.1016/j.jclepro.2016.06.199
20. M. P. M. P. Brundage, W. Z. W. Z. Bernstein, S. Hoffenson, Q. Chang, H. Nishi, T. Kliks and K. C. C. Morris, *J. Clean. Prod.*, 2018, **187**, 877 LINK https://doi.org/10.1016/j.jclepro.2018.03.187
21. C. Choi, C. Esposito, H. Wang, Z. Liu and J. Choi, *IEEE Commun. Mag.*, 2018, **56**, (7), 212 LINK https://doi.org/10.1109/MCOM.2018.1700880
22. M. Deakin and A. Reid, *J. Clean. Prod.*, 2018, **173**, 39 LINK https://doi.org/10.1016/j.jclepro.2016.12.054
23. R. Dubey, A. Gunasekaran, S. J. Childe, Z. Luo, S. F. Wamba, D. Roubaud and C. Foropon, *J. Clean. Prod.*, 2018, **196**, 1508 LINK https://doi.org/10.1016/j.jclepro.2018.06.097
24. Y. Guo, F. Hu, H. Allaoui and Y. Boulaksil, *Int. J. Prod. Res.*, 2018, **0**, (0), 1 LINK https://doi.org/10.1080/00207543.2018.1556412
25. Z. Guo, K. Zhou, C. Zhang, X. Lu, W. Chen and S. Yang, *Renew. Sustain. ENERGY Rev.*, 2018, **81**, (1), 399 LINK https://doi.org/10.1016/j.rser.2017.07.046
26. P. Ifaei, A. Farid and C. Yoo, *Energy*, 2018, **158**, 357 LINK https://doi.org/10.1016/j.energy.2018.06.043
27. P. Jatinkumar Shah, T. Anagnostopoulos, A. Zaslavsky, S. Behdad, P. J. Shah, T. Anagnostopoulos, A. Zaslaysky and S. Behdad, *WASTE Manag.*, 2018, **78**, 104 LINK https://doi.org/10.1016/j.wasman.2018.05.019
28. Z. Jiao, L. Ran, Y. Zhang, Z. Li and W. Zhang, *J. Clean. Prod.*, 2018, **185**, 105 LINK https://doi.org/10.1016/j.jclepro.2018.02.255
29. T.-C. Kuo and S. Smith, *J. Clean. Prod.*, 2018, **192**, 207 LINK https://doi.org/10.1016/j.jclepro.2018.04.212
30. A. Kusiak, *Int. J. Prod. Res.*, 2018, **56**, (1–2), 508 LINK https://doi.org/10.1080/00207543.2017.1351644
31. W. Li, T. Yang, F. C. F. C. F. C. Delicato, P. F. P. F. Pires, Z. Tari, S. U. S. U. Khan and A. Y. A. Y. Zomaya, *IEEE Commun. Mag.*, 2018, **56**, (5), 94 LINK https://doi.org/10.1109/MCOM.2018.1700888
32. W. Lu, X. Chen, Y. Y. Peng and X. Liu, 'The Effects of Green Building on Construction Waste Minimization: Triangulating "Big Data" with "Thick Data"' (2018), 2018 LINK https://doi.org/10.1016/j.wasman.2018.07.030
33. E. Manavalan and K. Jayakrishna, *Comput. Ind. Eng.*, 2018, (November), LINK https://doi.org/10.1016/j.cie.2018.11.030
34. R. Olszewski, P. Pałka and A. Turek, *Sensors (Switzerland)*, 2018, **18**, (1), LINK

https://doi.org/10.3390/s18010141

35. A. Singh, S. Kumari, H. Malekpoor and N. Mishra, *J. Clean. Prod.*, 2018, **202**, 139 LINK https://doi.org/10.1016/j.jclepro.2018.07.236
36. Y. Zhang, S. Liu, Y. Liu, H. Yang, M. Li, D. Huisingh and L. Wang, *J. Clean. Prod.*, 2018, **185**, 562 LINK https://doi.org/10.1016/j.jclepro.2018.02.061
37. Y. Zhang, J. Wang and Y. Liu, *J. Clean. Prod.*, 2018, **167**, 665 LINK https://doi.org/10.1016/j.jclepro.2017.08.068
38. P. X. W. Zou, X. Xu, J. Sanjayan and J. Wang, 'Review of 10 Years Research on Building Energy Performance Gap: Life-Cycle and Stakeholder Perspectives' (2018), 2018 LINK https://doi.org/10.1016/j.enbuild.2018.08.040
39. Y. Xue, Z. Wen, H. Bressers and N. Ai, 'Can Intelligent Collection Integrate Informal Sector for Urban Resource Recycling in China?' (2019), 2019 LINK https://doi.org/10.1016/j.jclepro.2018.10.155
40. Ellen MacArthur Foundation 2019, LINK http://www.ellenmacarthurfoundation.org/publications
41. ISO, 'ISO 20400', International Organization for Standardization 2017 : https://www.iso.org/obp/ui/es/#iso:std:iso:20400:ed-1:v1:en (Accessed on 27 December 2018)
42. G. Brundtland, *Oxford Pap.*, 1987, **Report of**, 400
43. World Economic Forum 2016, (January), 1

Appendix 4

Word Cloud Generation Considerations

List of most frequent 150 expressions transformed into the word cloud with corresponding frequencies:

Most Frequent 150 expressions and frequencies					
product	5658	measure	1413	physic	950
energy	4894	strategy	1395	grow	950
process	4278	smart	1394	global	946
develop	4241	distribution	1391	tool	943
service	3745	transport	1379	activity	933
environment	3601	device	1374	limit	917
time	3575	framework	1347	public	914
design	3352	social	1338	predict	898
system	3287	infrastructure	1331	access	897
power	3187	creation	1297	emission	888
city	3036	communication	1297	standard	878
urban	2984	utilization	1281	practice	858
operation	2811	business	1244	benefit	837
person	2755	component	1234	flow	837
network	2715	demand	1211	safe	831
application	2698	integrate	1207	platform	828
organization	2566	cloudcomputing	1170	dynamic	825
cost	2463	knowledge	1168	experience	820
sensor	2338	identify	1165	layer	818
improve	2311	implement	1162	field	815
resource	2157	relation	1148	smartsustainablecity	814
generate	2143	innovation	1136	grid	811
level	2137	behavior	1133	aware	811
manufacture	2103	customer	1125	stage	802
reduce	2099	issue	1124	opportunity	802
industry	2003	project	1111	domain	799

Most Frequent 150 expressions and frequencies					
consumer	1897	complex	1105	engineering	798
control	1861	potential	1100	architecture	796
optimization	1770	energyconsumption	1088	supplychain	781
waste	1758	supply	1062	human	775
smartcity	1725	vehicle	1060	mobile	768
solution	1724	recycle	1058	market	767
efficiency	1714	simulation	1047	life	761
economy	1704	evaluation	1032	estimate	757
decision	1703	green	1015	storage	748
building	1689	structure	1013	eco	748
real	1649	impact	1012	role	738
node	1606	share	1006	program	736
function	1585	condition	1006	connection	730
plan	1575	water	1005	china	729
electric	1568	key	1005	server	720
increase	1551	quality	1000	machine	717
material	1544	intelligence	995	lifecycle	703
compute	1527	policy	978	relevant	696
future	1498	factor	967	load	696
local	1481	advance	966	input	685
challenge	1470	algorithm	963	sector	679
source	1466	rate	958	equipment	679
technical	1463	effective	958	offer	678
monitor	1450	produce	956	renewableenergy	672

Additional stop words list compiled by authors in order to provide a more cleansed word cloud for analysis. Main articles' search topics such as "big data" and "internet of things" were also included in the list not to pollute results with obvious words and expressions. Journal, Editor, Conference, Paper names also discarded. Only words contained on the top 1,000 list shown:

Custom Stop Words List				
abstract	bias	discussion	item	result
accepted manuscript	big data	download	journal	review
achieve	bring	enable	<*journal names*>	scale
action	called	enabled	literature	science
add	carried	enabling	main	selected
adding	change	enterpris	manage	selection
addition	changing	enterprise	managing	set
additional	characteristic	examine	mentioned	specific
additionally	circular economy	exist	method	step
address	collect	existing	methodological	studied
addressed	combined	fig	methodology	study
addressing	compared	fig1	model	suggest
aim	compose	fig3	multi	suggested
aimed	concept	fig4	multiple	suggesting
aiming	conceptual	figure	note	suggestion
analyse	conclusion	finally	objective	support
analysed	conducted	finding	paper	sustainability
analyser	consideration	focus	perform	sustainable
analysing	considered	form	possibility	system
analysis	consist	goal	previou	table
analyze	context	ict	previous	technology
analyzed	contribution	identification	prior	term
analyzer	copyright	implemented	proposed	theory
analyzing	criterion	improve	provide	total
applied	current	improved	providing	type
apply	data	include	reason	typically
approach	datum	including	refer	understand
article	define	increasing	regard	understanding
aspect	defined	integrated	represent	unit
association	definition	internet of things	require	university
author	degree	introduced	required	variable
based	difference	involved	requirement	view

Custom Stop Words List			
basic	discussed	iot	researcher

Criteria for adding words in the custom stop words list:

Criterion	Description	Examples
Regular words	Words commonly used in scientific documents, not directly related to the subject being analysed	Research, view, table, figure, manuscript, data, paper, finding, objective, methodology, research, author, theory, apply
Verbs / Adverbs	Common verbs and adverbs	Typically, analyse, finally, additionally, view, define, propose, consist, include
Query criteria	Words used on the query criteria or directly related	circular economy, big data, internet of things, sustainability, technology.

Expressions composed by two, three or four words (bigrams, trigrams and 4-grams), bound together to be treated as one (e.g. "data mining" transformed into "datamining" not to be counted in "data", neither in "mining"). Only expressions contained on the top 1,000 list shown:

Bigrams and Trigrams bound together			
bigdataapplication	distributedenergyresource	machinelearning	sustainablecitiesandsociety
businessmodel	energyconsumption	powerconsumption	sustainablecity
climatechange	energyefficent	productlifecycle	sustainabledevelopment
co2emission	energyefficiency	renewableenergy	sustainableurbanform
competitiveadvantage	energymanagement	reverselogistic	urbanenvironment
datacenter	energysaving	smartcity	urbansustainability
datacollection	energystorage	smartgrid	wastecollection
datamining	environmentalimpact	smartmeter	wastemanagement
dataprocessing	environmentalsustainability	smartphone	
demandresponse	literaturereview	supplychain	

Word stemming was also an used technique to link similar words according to their radicals (e.g. words "reused", "reusable", "reusing" transformed into "reuse"). Authors tried to perform it with the use of automated processes with the support of "R" statistical tool functions, but results were not satisfactory. Although automated processes were able to perform word stemming, similar words with different meanings were converted (e.g "governance" bound with "govern"). So authors decided to perform word stemming manually. The list of words kept separated are listed:

Similar words kept separated	
build / building	inform / informal
bus / busy	initial / initiative
effect / effective	land / landscape
employ / employed / employee	market / marketing
establish / establishment	natural / naturally / nature
facilitate / facility	popular / population
govern / governance	short / shortage
hard / hardware	

Manually stemmed words (only expressions contained on the top 1,000 list shown):

Manually stemmed words		
adoption - adopt	functionality - function	personal - person
automated - automation	generating - generate	physical - physic
cloud - cloudcomputing	generation - generate	planning - plan
collaboration - collaborative	growing - grow	pollutant - pollution
comparison - compare	growth - grow	predicted - predict
computing - compute	identified - identify	prediction - predict
concerned - concern	identify - identify	predictive - predict
consumption - consumer	identifying - identify	pricing - price
continuou - continue	implementation - implement	processing - process
created - creation	implementing - implement	produced - produce
creating - creation	improvement - improve	producer - produce
databasis - database	innovative - innovation	production - product

Manually stemmed words		
deliver - deliver	learning - learn	productivity - produce
deployed - deployment	limitation - limit	programming - program
designer - design	limited - limit	ratio - rate
development - develop	linked - link	recycling - recycle
economic - economy	location - local	reduction - reduce
effectively - effective	management - manage	relationship - relation
efficiently - efficiency	manufacturer - manufacture	remanufacturing - remanufacture
embedded - embed	manufacturing - manufacture	safety - safe
enhanced - improve	mapping - map	save - safe
enhancing - enhance	measured - measure	saving - safe
environmental - environment	measurement - measure	scheduling - schedule
environmentally - environment	metallurgical - metal	structured - structure
essential - essence	mobility - mobile	supplier - supply
established - establish	monitored - monitor	technique - technical
estimated - estimate	monitoring - monitor	transformation - transform
estimation - estimate	networking - network	transportation - transport
european - europe	offering - offer	uncertainty - uncertain
evaluated - evaluation	operate - operation	utility - utilization
expected - expect	operator - operation	utilize - utilization
experiment - experience	performance - perform	utilized - utilization
financial - finance	performed - perform	

Appendix 5

Complete query logic reproduction for both Scopus and WOS databases retrieved from previous research (1):

Circular Economy:

```
(TITLE-ABS-KEY((
(
"3R" OR "5R" OR "6R" OR "Bioeconom*" OR "Biomimicry" OR "Carbon Biofixation" OR
"Carbon Capture And Storage" OR "Carbon Capture And Utilization" OR "Carbon Dioxide
Recovery" OR "Carbon Emission Reduction" OR "Carbon Footprint Reduction" OR "Carbon
Sequestration" OR "Climate Bond" OR "Closed Loop" OR "Co2 Emissions Reduction" OR
"Collaborative Consumption" OR "Collaborative Econom*" OR "Collaborative Model" OR
"Collaborative Technolog*" OR "Complex Circular Ecosystem" OR "Cradle to Cradle" OR
"Development Model In Circular" OR"E-Waste" OR  "Eco Cycle Industry" OR "Electronic
Waste" OR "Emission Cutting" OR "Emission Reduct*" OR "End Of Life" OR "End Of
Waste" OR "Environmental Efficiency" OR "Environmental Oriented Supply Chain
Cooperation" OR "Environmental Supply Chain Cooperation" OR "Environmentally
Responsible Manufacturing" OR "Extended Producer Responsibility" OR "Green Econom*"
OR "Green Manufactur*" OR "Green Remanufactur*" OR "Green Supply Chain" OR
"Industrial Ecology" OR "Industrial Symbiosis" OR "Integrated Waste Management" OR
"Intra County Cyclic Econom*" OR "Life Cycle Assessment" OR "Life Cycle Management"
OR "Life Cycle Optimization" OR "Life Cycle Thinking" OR "Low Carbon Agriculture"
OR "Low Carbon City Strategies" OR "Low Carbon Development" OR "Low Carbon
Ecological Mining" OR "Low Carbon Econom*" OR "Low Carbon Enterprise" OR "Low
Carbon Future Cit*" OR "Low Carbon Governance" OR "Low Carbon Hotel" OR "Low Carbon
Innovative System" OR "Low Carbon Management" OR "Low Carbon Office" OR "Low Carbon
Policy" OR "Low Carbon Scenario" OR "Low Carbon Technolog*" OR "Low Carbon
Transition" OR "Material Efficiency" OR "Material Flow Analysis" OR "Optimal Model
Circular" OR"Performance Econom*" OR "Product Life Cycle" OR ("Reduc*" AND "Reus*"
AND "Recycl*") OR "Refurbishment" OR "Regenerative Design" OR "Regenerative
Econom*" OR "Remanufacturing" OR "Renewable Energy" OR "Renewable Resource" OR
"Resource Efficiency" OR "Resource Recirculation" OR "Resource Recovery" OR
"Restorative Econom*" OR "Reverse Logistics" OR "Service Life Extension" OR
"Sharing Cit*" OR "Sharing Econom*" OR "Sharing Societ*" OR "Sharing Value System"
OR "Sustainable Agriculture" OR "Sustainable Business Model" OR "Sustainable Cit*"
OR "Sustainable Consumption" OR "Sustainable Industrial Development" OR
"Sustainable Logistics" OR "Sustainable Materials Management" OR "Sustainable
Resource Use" OR "Sustainable Supply Chain Network" OR "Sustainable Waste
Management" OR "Waste Prevention" OR "Waste Recovery" OR "Waste Reduction" OR
"Waste To Energy" OR "Waste To Materials" OR "Waste To Resource" OR "Waste To
Value" OR "Zero Emissions" OR "Zero Value Residue" OR "Zero Waste"
)
AND
("sustainability" OR "sustainable"))
OR
(
       "Circular Econom*" OR
       "Circular Agriculture" OR
       "Circular Business Model" OR
       "Circular Competence Indicator" OR
       "Circular Corporation" OR
       "Circular Ecology" OR
       "Circular Industr*" OR
       "Circular Management" OR
       "Circular Product*" OR
       "Circular Supply Chain" OR
       "Circular Technology Innovation" OR
       "Circular Transition Framework" OR
       "Circular Value Chain*" OR
       "Circulatory Econom*"
       )
       )
)
```

Big Data and IoT:

```
(TITLE-ABS-KEY(
       ("Big Data" OR "Bigdata") OR
       ("Internet of Things") OR
       (("Spark Streaming" OR "Mlib" OR "Spark R" OR
       "Machine Learning") AND "Apache") OR
       (("Hdfs" OR "Cfs") AND "File System") OR
       ("Mizan" AND "Kaust") OR
       ("Presto" AND "SQL") OR
       ("Apache Avro") OR ("Apache Cassandra") OR ("Apache Drill") OR
       ("Apache Flink") OR ("Apache Flume") OR ("Apache Giraph") OR
       ("Apache Hive") OR ("Apache Impala") OR ("Apache Kafka") OR
       ("Apache Mesos") OR ("Apache Mrql") OR ("Apache Pig") OR
       ("Apache S4") OR ("Apache Samza") OR ("Apache Spark") OR
       ("Apache Storm") OR ("Apache Tajo") OR ("Apache Tez") OR
       ("Apache Yarn") OR ("Cloudera") OR ("Google Bigquery") OR
       ("Google Pregel") OR ("Graphchi") OR ("Graphlab") OR
       ("Graphx") OR ("Hadoop") OR ("Hbase") OR ("Ibm Big Sql") OR
       ("Ibm Infosphere Streams") OR ("Infosphere Biginsights") OR
       ("Mapr") OR ("Mapreduce") OR ("Microsoft Graph Engine") OR
       ("Microsoft Trinity") OR ("Nosql") OR ("Pivotal Hawq") OR
       ("Platfora") OR ("Powergraph") OR ("Pregelix") OR
       ("Spark Sql") OR ("Trifcata") OR ("Turbograph")
)
)
```

Appendix 6

Coding categories criteria for the 226 mapped documents:

Category	Description	Criteria
Country	Paper Country / Region	Scopus and WoS Databases do not retrieve country names. Documents were assigned to countries according to (in this order of priority): author affiliation—main author affiliation—conference location— journal location—source title location, using the same criteria applied in prior research. Regions were automatically assigned according to countries.
SIC Code	Standard Industry Codes - the primary business activity identified in each document (2)	SIC codes assigned to papers with corresponding criteria: - Agriculture, Forestry, Fishing: Sustainable agriculture, greenhouse technologies, forest bioeconomy and logistics; - Building Construction: Smart and Green Buildings, Living Labs, Buildings CO2 Emissions - Business Services: Sustainable technology service solutions and datacentres - Chemicals and Allied Products: Chemical Companies - Computer and Office Equipment: Technology Companies - Cross: Not a SIC code – assigned to generic documents not related to specific industries, areas or activity types - Educational Services: Schools and other education organizations - Electric, Gas and Sanitary Services: Power plants, electricity utilities - Engineering Services: equipment's sustainable design, lifecycle engineering - Food and Kindred Products: Food industries - Health Services: Healthcare - Manufacturing: Cleaner / sustainable manufacturing and plants, smart units - Mining: sustainable mining / metallurgical IoT - Private Households: Sustainable houses, household appliances - Public Administration: Smart and sustainable cities, smart grids, public areas (transportation excluded) - Retail Trade: Retail industry - Transportation & Public Utilities: Transportation services and infrastructure (public and private)

		- Transportation Equipment: automobile and other transportation vehicles
Methodology Type	Document's main methodology applied	Document's main methodology type: - Case: Case studies - Model: New models, frameworks and platforms proposition - Review: Literature reviews, models and frameworks reviews - Survey: Surveys, questionnaires application - Theory: New theories proposal
CE Principle	CE principles classification according to selected framework (3)	Document's mapped CE principles: - Design: Sustainable / Circular enabled designs of solutions, services, products or environments (i.e smart cities) - Reuse: Items that are not waste being used again for the same purpose for which they were conceived - Reduction: Initiatives focused on reduce the use of materials, slowing down resource consumption. Waste reduction, energy savings and sharing / collaborative economy activities included. - Recycle: recovery operations where waste materials are reprocessed into products, materials or substances whether for the original or other purposes - Reclassification: Materials reclassification into technical or nutrients with support of technology, and the use of the results into generating sustainable / circular solutions; - Renewable Energy: Renewable energy generation or use with the support of modern IT resources or to enable technology use.

Appendix 7

Complete document list with corresponding attributes mapped during literature review:

Ref	Type	SIC code	Circular Economy Related Principle					
			Design	Reduction	Reuse	Recycle	Reclass.	Ren. Energy
(4)	Model	Agriculture, Forestry, Fishing		X				
(5)	Review	Public Administration	X					
(6)	Theory	Engineering Services				X		
(7)	Review	Agriculture, Forestry, Fishing		X				X
(8)	Model	Public Administration		X				
(9)	Case	Public Administration	X	X				X
(10)	Model	Public Administration	X					
(11)	Review	CROSS	X					
(12)	Review	Public Administration	X	X	X	X		X
(13)	Model	Manufacturing		X				
(14)	Model	Agriculture, Forestry, Fishing		X				
(15)	Model	Electric, Gas and Sanitary Services						
(16)	Review	Public Administration		X				
(17)	Review	Transportation Equipment				X		
(18)	Model	CROSS		X				
(19)	Case	Retail Trade	X	X				
(20)	Model	Building Construction	X		X			

Ref	Type	SIC code	Circular Economy Related Principle					
			Design	Reduction	Reuse	Recycle	Reclass.	Ren. Energy
(21)	Model	Transportation & Public Utilities		X	X			
(22)	Model	Public Administration				X		
(23)	Model	Manufacturing		X				
(24)	Review	Public Administration	X					
(25)	Review	Transportation Equipment	X	X	X	X		
(26)	Model	Food and Kindred Products		X				
(27)	Survey	Manufacturing		X				
(28)	Review	CROSS	X	X				X
(29)	Review	Agriculture, Forestry, Fishing		X				
(30)	Review	Electric, Gas and Sanitary Services		X				X
(31)	Review	CROSS		X	X	X		X
(32)	Review	CROSS		X	X	X		X
(33)	Case	CROSS						X
(34)	Model	Public Administration	X	X				
(35)	Model	Building Construction		X				
(36)	Model	Building Construction		X				
(37)	Case	Public Administration				X		
(38)	Case	Public Administration		X				
(39)	Review	CROSS		X				

Ref	Type	SIC code	Circular Economy Related Principle					
			Design	Reduction	Reuse	Recycle	Reclass.	Ren. Energy
(40)	Model	Transportation & Public Utilities		X				
(41)	Model	CROSS		X				
(42)	Review	Agriculture, Forestry, Fishing		X				
(43)	Model	CROSS	X	X	X			
(44)	Review	CROSS		X	X	X		
(45)	Model	Public Administration		X				X
(46)	Review	Manufacturing	X	X		X		
(47)	Model	Public Administration		X				
(48)	Model	Public Administration	X					
(49)	Case	Public Administration	X					
(50)	Model	CROSS	X			X		
(51)	Review	Public Administration	X		X			
(52)	Case	Public Administration	X					
(53)	Model	Agriculture, Forestry, Fishing		X				
(54)	Model	CROSS			X			
(55)	Model	Manufacturing		X		X		
(56)	Model	CROSS	X	X				
(57)	Model	CROSS						X
(58)	Case	Building Construction		X				
(59)	Model	Building Construction	X		X			
(60)	Model	Public Administration		X				X

Ref	Type	SIC code	Circular Economy Related Principle					
			Design	Reduction	Reuse	Recycle	Reclass.	Ren. Energy
(61)	Review	CROSS		X				
(62)	Model	Transportation Equipment		X	X			
(63)	Model	Manufacturing	X					
(64)	Case	Public Administration	X					
(65)	Review	Business Services	X	X				
(66)	Review	Mining	X			X		
(67)	Review	CROSS	X	X	X	X		
(68)	Model	CROSS		X				
(69)	Case	Public Administration	X					
(70)	Review	Engineering Services	X		X	X		
(71)	Review	Building Construction		X				
(72)	Review	CROSS			X	X		
(73)	Model	Manufacturing		X				
(74)	Case	Public Administration	X					
(75)	Case	Public Administration	X	X				
(76)	Review	Public Administration						X
(77)	Review	Private Households		X				X
(78)	Model	Retail Trade		X				
(79)	Case	Public Administration	X	X				X
(80)	Model	Public Administration	X	X				X
(81)	Model	CROSS	X	X				X

Ref	Type	SIC code	Circular Economy Related Principle					
			Design	Reduction	Reuse	Recycle	Reclass.	Ren. Energy
(82)	Case	Electric, Gas and Sanitary Services		X				X
(83)	Review	Building Construction	X	X	X	X		X
(84)	Case	Manufacturing		X				
(85)	Review	Manufacturing		X				
(86)	Review	CROSS		X		X		
(87)	Review	CROSS	X	X				
(88)	Case	Public Administration	X	X				
(89)	Case	Public Administration		X				
(90)	Survey	Manufacturing		X	X	X		
(91)	Model	Private Households		X	X	X		
(92)	Theory	Public Administration	X					
(93)	Model	CROSS	X	X	X	X		
(94)	Model	Public Administration	X					
(95)	Model	CROSS	X					
(96)	Model	CROSS	X	X	X	X		
(97)	Model	CROSS		X				
(98)	Model	CROSS				X		
(99)	Survey	CROSS	X	X		X		
(100)	Model	CROSS	X	X				
(101)	Model	CROSS	X	X				
(102)	Case	Building Construction	X					X

Ref	Type	SIC code	Circular Economy Related Principle					
			Design	Reduction	Reuse	Recycle	Reclass.	Ren. Energy
(103)	Review	CROSS	X	X	X	X		X
(104)	Case	Public Administration	X					
(105)	Review	CROSS	X	X	X			X
(106)	Review	Engineering Services						X
(107)	Review	Public Administration	X					
(108)	Review	Public Administration	X	X				X
(109)	Case	Public Administration	X					
(110)	Review	Transportation Equipment		X				X
(111)	Case	Public Administration		X				X
(112)	Model	CROSS	X	X				
(113)	Review	CROSS		X				X
(114)	Model	CROSS				X		
(115)	Review	CROSS	X	X	X	X		
(116)	Model	Public Administration	X					
(117)	Model	Transportation Equipment	X					X
(118)	Review	Building Construction	X	X				X
(119)	Model	Public Administration	X	X	X	X		X
(120)	Model	CROSS		X		X		
(121)	Model	CROSS		X				
(122)	Review	Public Administration	X					X
(123)	Model	Transportation Equipment		X	X	X		

Ref	Type	SIC code	Circular Economy Related Principle					
			Design	Reduction	Reuse	Recycle	Reclass.	Ren. Energy
(124)	Model	Private Households		X				X
(125)	Case	Public Administration		X	X			
(126)	Review	Public Administration	X	X	X			X
(127)	Model	CROSS		X				
(128)	Model	CROSS						X
(129)	Review	Public Administration	X					
(130)	Model	Transportation & Public Utilities	X					
(131)	Model	CROSS	X					
(132)	Review	Manufacturing			X	X		
(133)	Review	Manufacturing			X	X		
(134)	Model	CROSS						X
(135)	Model	Public Administration	X					
(136)	Model	Engineering Services		X		X		
(137)	Case	Manufacturing		X				
(138)	Case	Computer and Office Equipment	X	X				
(139)	Case	Business Services		X				
(140)	Review	CROSS		X	X			
(141)	Theory	Public Administration		X				
(142)	Model	CROSS	X	X	X	X		X
(143)	Review	CROSS		X				X

Ref	Type	SIC code	Circular Economy Related Principle					
			Design	Reduction	Reuse	Recycle	Reclass.	Ren. Energy
(144)	Model	CROSS						X
(145)	Model	CROSS		X				
(146)	Model	Private Households		X				X
(147)	Model	Educational Services		X				
(148)	Case	Public Administration						X
(149)	Case	Transportation Equipment			X	X		
(150)	Review	CROSS	X	X	X	X		
(151)	Review	Manufacturing			X			
(152)	Model	Public Administration		X	X	X		
(153)	Case	Public Administration	X					
(154)	Model	Retail Trade	X	X	X	X		
(155)	Case	Public Administration	X					
(156)	Review	CROSS	X					X
(157)	Case	Public Administration						X
(158)	Review	CROSS	X	X	X			
(159)	Review	CROSS					X	X
(160)	Model	Public Administration						X
(161)	Model	Business Services			X			
(162)	Review	Transportation Equipment		X	X			
(163)	Case	Public Administration						X
(164)	Case	Educational Services		X				

Ref	Type	SIC code	Circular Economy Related Principle					
			Design	Reduction	Reuse	Recycle	Reclass.	Ren. Energy
(165)	Review	Private Households		X				
(166)	Review	Building Construction	X	X				
(167)	Model	Manufacturing		X		X		
(168)	Review	CROSS		X				
(169)	Case	Retail Trade		X	X	X		
(170)	Review	Chemicals and Allied Products		X				
(171)	Review	Agriculture, Forestry, Fishing		X				
(172)	Review	Building Construction		X				
(173)	Review	Building Construction		X	X	X		
(1)	Review	CROSS	X	X	X	X		X
(174)	Model	CROSS						X
(175)	Model	Public Administration	X	X				
(176)	Model	CROSS		X				X
(177)	Review	CROSS		X	X			
(178)	Model	Public Administration				X	X	
(179)	Review	Public Administration	X	X				
(180)	Model	Public Administration	X	X				
(181)	Review	Public Administration	X	X				
(182)	Review	Public Administration		X				X
(183)	Model	Public Administration	X	X				X
(184)	Review	Public Administration	X	X				X

Ref	Type	SIC code	Circular Economy Related Principle					
			Design	Reduction	Reuse	Recycle	Reclass.	Ren. Energy
(185)	Review	Manufacturing		x	x			x
(186)	Case	Building Construction	X	X				
(187)	Review	Public Administration	X	X				X
(188)	Model	CROSS		X				
(189)	Model	Public Administration	X					X
(190)	Model	CROSS						X
(191)	Model	Agriculture, Forestry, Fishing						X
(192)	Case	Public Administration		X	X			
(193)	Model	Public Administration				X		
(194)	Model	Public Administration	X	X	X			X
(195)	Model	CROSS		X				
(196)	Review	CROSS	X	X				
(197)	Review	Public Administration	X					
(198)	Survey	CROSS						X
(199)	Survey	Manufacturing		X				X
(200)	Case	Public Administration		X				
(201)	Case	Public Administration		X				
(202)	Case	CROSS				X		
(203)	Model	CROSS		X				
(204)	Review	CROSS						X
(205)	Model	CROSS	X	X	X	X		

Ref	Type	SIC code	Circular Economy Related Principle					
			Design	Reduction	Reuse	Recycle	Reclass.	Ren. Energy
(206)	Model	Public Administration				X		
(207)	Review	Agriculture, Forestry, Fishing		X				X
(208)	Review	Mining			X			
(209)	Review	Business Services						
(210)	Review	CROSS	X	X	X	X		X
(211)	Review	CROSS		X				
(212)	Case	Public Administration		X				
(213)	Model	Manufacturing		X	X	X		
(214)	Model	Business Services						X
(215)	Model	CROSS		X	X	X		
(216)	Model	Public Administration		X				X
(217)	Model	Business Services						X
(218)	Review	Public Administration		X				X
(219)	Review	Public Administration	X	X				
(220)	Case	Public Administration		X				
(221)	Review	Business Services	X	X	X	X		X
(222)	Review	Public Administration	X	X				
(223)	Case	Building Construction		X				X
(224)	Review	Health Services		X				
(225)	Model	Agriculture, Forestry, Fishing	X	X				
(226)	Model	CROSS		X				X

Ref	Type	SIC code	Circular Economy Related Principle					
			Design	Reduction	Reuse	Recycle	Reclass.	Ren. Energy
(227)	Case	Public Administration		X				X
(228)	Model	Agriculture, Forestry, Fishing		X				X

Appendix 8

Selected practical case studies mapped during the literature review for distinct industries and countries in order to illustrate how CE can be fostered by Big Data and IoT.

Title	Country	SIC Code	Related CE Principles	References	Case Description
Evaluation on China's forestry resources efficiency based on big data	China	Public Administration	Reduction	(89)	The study collected and processed data from 31 Chinese cities based on big data concepts in order to identify best resource efficiency practices.
Multi-level awareness of energy used in production processes	Germany	Manufacturing	Reduction	(229)	Study was carried out to integrate electrical energy data, production data and scheduling data in real time to achieve the multi-level awareness of energy used in production. Results show that integrating energy with production data enables factories to provide specific energy consumption information for decision makers at the factory level, as well as for the consumers and the regulators.

Title	Country	SIC Code	Related CE Principles	References	Case Description
The role of digital technologies to overcome Circular Economy challenges in PSS Business Models: An exploratory case study	Italy	Retail Trade	Reduction Reuse Recycle	(169)	A household appliance retailer adopting the Product-Service System (PSS) Business Model with the use of IoT, big data and analytics to successfully face Circular Economy challenges.
GreEn-ER living lab: A green building with energy aware occupants	France	Building Construction	Design Ren. Energy	(230)	A smart building located in a French eco-city in Grenoble, France, was designed to be "green" and act as a "living lab" to support research and teaching. Heating, ventilation and air conditioning (HVAC) and lighting or blinding was based on local temperature and equipped with wireless sensors.
Enhancement of an equipment reliability program with smart, connected power plant assets	USA	Electric, Gas and Sanitary Services	Reduction Ren. Energy	(82)	Duke Energy's approach to apply smart, connected power plant assets to greatly enhance its generation equipment reliability program and processes with the use of an on-line monitoring platform.

Appendix 9

Research initially mapped current CE frameworks available in the literature, by using the expressions "Circular Economy" and "framework" in Scopus database. The top 10 list considered only those retrieved from top journals (i.e. scimago >20) and with more than 5 citations. Larger number of citations in scientific articles and references on Google led to a perception of maturity and stability (i.e. framework has been tested a number of times and proved to be reliable). In order to assess popularity in Google, the query (<FRAMEWORK NAME> AND <AUTHOR? AND "circular economy") was applied (e.g. "resolve framework" "ellen macarthur" "circular economy")

Framework Name	Description	Popularity		IT Related?	Ref.
		Citations	Google		
ReSOLVE	Introduced by the Ellen MacArthur Foundation (EMF), the framework offers organizations a tool for generating circular strategies and growth initiatives, composed by the levers: (a) Regenerate, (b) Share, (c) Optimise, (d) Loop, (e) Virtualize and (f) Exchange	5	593	X	(231, 232)
A comprehensive CE framework	Focused on the manufacturing industry but portable to others, this framework was proposed through a comprehensive literature review and is based on economic benefits, environmental impact and resource scarcity	284	415	-	(233)
The 9R Framework	The framework extends the classical concept of 3R's to nine definitions, and suggests an increase of circularity for each one: Recovery of Energy (less circular: incineration), Recycle, Repurpose, Remanufacture, Refurbish, Repair, Reuse, Reduce, Rethink and Refuse (more circular: make product redundant)	198	54	-	(234)

Framework Name	Description	Popularity		IT Related?	Ref.
		Citations	Google		
Circular economy product and business model strategy framework	A simplified strategy framework to support the transition to a circular economy. It proposes the need of design and business model strategies to be implemented in conjunction in order to better drive circularity. Authors consider it *a first starting point to provide academics and practitioners with an overview and potential guidance to adopt strategies in a circular economy*	193	10	-	(235)
Six dimensions for building research in a circular economy	Focused on the building environment but portable to other industries, the framework presents an extension of the three pillars of sustainability (economic, environmental and social) with other three dimensions: government, matter (e.g. design, technology, materials) and behavioural.	66	7	X	(236)
Complex Value Optimisation for Resource Recovery (CVORR) framework	The CVORR framework combines scientific and engineering methods with a socio-political narrative grounded in the systems of provision approach and seeks to assess how value is created, destroyed and distributed in resource recovery from waste systems	31	292	-	(237)
BECE Framework	The backcasting and eco-design for the circular economy (BECE) framework aims to enable organizations to implement CE requirements in a more structured way by bringing operational and systems thinking together, thus increasing the likelihood of successful implementation	24	447	-	(238)
Framework and throughput indicators for an economy-wide CE assessment	A comprehensive and economy-wide biophysical assessment of a CE, utilizing and systematically linking official statistics on resource extraction and use and waste flows in a mass-balanced approach	8	1	-	(239)
A framework of CE indicators	The framework provides the basis for developing indicators for measuring and monitoring whole organisation, supply chain, production and operations activities	6	2	-	(240)

Framework Name	Description	Popularity		IT Related?	Ref.
		Citations	Google		
An integrative framework representing the relationships between GHRM, the CE and sustainable organizational performance	A framework that integrates CE with Green Human Resource Management and sustainable organizational performance	6	0	-	(241)

Appendix 10

R statistical tool (242) code used for Word Cloud generation. The following libraries were used: ggplot2 (243), githubinstall (244), pluralize (245), RWeka (246, 247), SnowballC (248), stopwords (249), tm (250, 251), wordcloud (252).

```
################################################################################
#                                                                              #
# Project Circular Economy / Big Data / IoT – Version 1.1                      #
#                                                                              #
# July, 2019   -   R Version: 3.5.1                                            #
#                                                                              #
# Required Packages: ggplot2, githubinstall, pluralize, RWeka, SnowballC,      #
#                    stopwords, tm, wordcloud                                  #
#                                                                              #
################################################################################

# Environment Initialization
rm(list=ls())
gc()
dev.off()

# Packages Load

library(tm)
library(SnowballC)
library(ggplot2)
library(wordcloud)
library(RWeka)
library(stopwords)
library(pluralize)
library(githubinstall)

toBibtex(citation())
toBibtex(citation("RWeka"))
toBibtex(citation("tm"))
toBibtex(citation("SnowballC"))
toBibtex(citation("ggplot2"))
toBibtex(citation("wordcloud"))
toBibtex(citation("stopwords"))
toBibtex(citation("pluralize"))
toBibtex(citation("githubinstall"))

# Timer 1 Initialization
tic1 <- proc.time()

# Parameters Declaration (Change Destination folders and files accordinly)
pdfconv <- "C:\\Dest_Folder\\pdftotext_64.exe"
Working_Dir  <- "C:\\Dest_Folder\\"
Working_Dir_Stop  <- "C:\\Dest_Folder\\"
setwd(Working_Dir)

# Files to be converted location
DEST <- "C:\\Dest_Folder\\"

# Files to be converted list
myfiles <- list.files(path = DEST, pattern = "pdf", full.names = TRUE)
```

```
#File conversion with pdftotext .exe file
lapply(myfiles, function(i) system(paste(pdfconv,paste0('"',i,'"')), wait =
FALSE))
warnings()

Sys.sleep(10) # 10 seconds pause to allow conversion to be finished in the
background (change as needed)

# Timer 2 Initialization
tic2 <- proc.time()

# References elimination
mytxtfiles <- list.files(path = DEST, pattern = "txt",  full.names = TRUE)
#REMOVE REFERENCES
nor <- function(i){
  j <- paste0(scan(i, what = character()), collapse = " ")
  a <- strsplit(j,"REFERENCES")
  if(length(a[[1]])==1){
    a <- strsplit(j,"References")
  }
  if(length(a[[1]])==1){
    a <- strsplit(j,"Bibliography")
  }
  j <- a[[1]][-length(a[[1]])]
  paste(j, collapse=" ")
}
conteudo <- lapply(mytxtfiles,nor)
lapply(1:length(conteudo),  function(i) write.table(conteudo[i],
file=paste(mytxtfiles[i], "NoRef", "txt", sep="."), quote = FALSE,
row.names = FALSE, col.names = FALSE, eol = " " ))

Sys.sleep(10) # 10 seconds pause to allow files to be saved in the
background (change as needed)

### MAIN ROUTINE

# Timer 3 Initialization
tic3 <- proc.time()

## Read to dataframe
myfiles <- list.files(path = DEST, pattern = "txt",  full.names = TRUE)

dm <- NULL
sizes <- NULL
sizeComplete <- NULL
#for(i in seq(2,length(myfiles),2)){      #use this if there are two txt's
for each pdf
# use this if there is one txt's for each pdf
for(i in 1:length(myfiles)){
      fname <- myfiles[i]
      contents <- readChar(fname, file.info(fname)$size)
      sizeComplete <- c(sizeComplete, file.info(fname)$size)
      if(file.info(fname)$size==1){
            print(paste(i, ": ", fname))
            next
      }
      sizes <- c(sizes,file.info(fname)$size)
```

```
      contents <- gsub ("\"","\'",contents)
      contents <- gsub ("\n",' ',contents)
      contents <- gsub ("\r",' ',contents)
      contents <- gsub ("\t",' ',contents)
      contents <- gsub ("\f",' ',contents)
      contents <- gsub ("\b",' ',contents)
      contents <- gsub ("-",' ',contents)
      contents <- gsub ("_",' ',contents)
      contents <- na.omit(contents)
      dm <- c(dm,contents)
}

#build a corpus, and specify the source to be character vectors]
myCorpus <- Corpus(VectorSource(dm))


# Shows first file contents. Change [[1]] to see others
writeLines(strwrap(myCorpus[[1]],width=78))

# Backup - original corpus
myCorpus_puro <- myCorpus

# Backup recovery if necessary
#myCorpus <- myCorpus_puro

#After that, the corpus need a couple of transformations, including
changing
#letters to lower case, and removing punctuations, numbers, and stop words.
#The general English stop-word list is tailored here by adding "available"
#and "via" and removing "r" and "big" (for big data). Hyperlinks are also
#removed in the example belowmyCorpus <- tm_map(myCorpus,
PlainTextDocument)

#converto to lower case
myCorpus <- tm_map(myCorpus, content_transformer(tolower))
myCorpus.bkp <- myCorpus
#myCorpus <- myCorpus.bkp
writeLines(strwrap(myCorpus[[233]],width=78))


# CORPUS TRANSFORMATION
# Only 10 out of 974 shown. For the complete list, please access the
original R file provided

myCorpus <- tm_map(myCorpus, content_transformer(gsub), pattern = "
recycler ", replacement = " recycle ")
myCorpus <- tm_map(myCorpus, content_transformer(gsub), pattern = "
reducing ", replacement = " reduce ")
myCorpus <- tm_map(myCorpus, content_transformer(gsub), pattern = "carbon
sequestration", replacement = "carbonsequestration")
myCorpus <- tm_map(myCorpus, content_transformer(gsub), pattern = "circular
agriculture", replacement = "circularagriculture")
myCorpus <- tm_map(myCorpus, content_transformer(gsub), pattern = "circular
corporation", replacement = "circularcorporation")
myCorpus <- tm_map(myCorpus, content_transformer(gsub), pattern = "circular
value chain", replacement = "circularvaluechain")
myCorpus <- tm_map(myCorpus, content_transformer(gsub), pattern = "circular
econom", replacement = "circulareconom")
```

```
myCorpus <- tm_map(myCorpus, content_transformer(gsub), pattern = "big
data", replacement = "bigdata")
myCorpus <- tm_map(myCorpus, content_transformer(gsub), pattern = "internet
of things", replacement = "internetofthings")
myCorpus <- tm_map(myCorpus, content_transformer(gsub), pattern = "springer
international publishing", replacement = "springerinternationalpublishing")

#remove punctuation
myCorpus <- tm_map(myCorpus,
content_transformer(removePunctuation),preserve_intra_word_dashes=T)

#remove URLs
removeURL <- function(x) gsub("http[[:alnum:]]*", "", x)
myCorpus <- tm_map(myCorpus, content_transformer(removeURL))

# Remove Inconsistend Char

myCorpus <- tm_map(myCorpus, content_transformer(gsub), pattern = "â ",
replacement = " ")
myCorpus <- tm_map(myCorpus, content_transformer(gsub), pattern = "ã ",
replacement = " ")
myCorpus <- tm_map(myCorpus, content_transformer(gsub), pattern = "Ã ",
replacement = " ")
myCorpus <- tm_map(myCorpus, content_transformer(gsub), pattern = "Â ",
replacement = " ")

#Manage stop words

myCorpus_semstopwords <- myCorpus
#myCorpus <- myCorpus_semstopwords

setwd(Working_Dir_Stop)
Stopwords_Custom <- read.csv2("Stopwords_Custom.txt", header = FALSE)
is(Stopwords_Custom)
Stopwords_Custom <- as.character(Stopwords_Custom$V1)
is(Stopwords_Custom)
setwd(Working_Dir)
getwd()

myStopwords_aux_1 <- stopwords('english', source = "stopwords-iso")
myStopwords_aux_2 <- c(myStopwords_aux_1,stopwords('english', source =
"snowball"))
myStopwords <- c(myStopwords_aux_2,stopwords('english', source = "smart"))

# Incluir essa linha se quisermos que haja stopwords customizadas
myStopwords <- c(myStopwords_aux_2,stopwords('english', source =
"smart"),Stopwords_Custom)

writeClipboard(myStopwords)

#remove "r" and "big" from stopwords
myStopwords <- setdiff(myStopwords, c("r","big"))

#remove stopwords from corpus
myCorpus <- tm_map(myCorpus, removeWords, myStopwords)
writeLines(strwrap(myCorpus[[1]],width=78))
#writeLines(strwrap(myCorpus_semstopwords[[1]],width=78))
```

```
BigramTokenizer <- function(x) NGramTokenizer(x, Weka_control(min = 1, max
= 3))

myTdm <- TermDocumentMatrix(myCorpus, control = list(tokenize =
BigramTokenizer))
termFrequency <- as.matrix(myTdm)
termFrequency_cons <- rowSums(as.matrix(myTdm))
myTdm_stem <- TermDocumentMatrix(myCorpus_stem, control = list(tokenize =
BigramTokenizer))
termFrequency_stem <- as.matrix(myTdm_stem)
termFrequency_cons_stem <- rowSums(as.matrix(myTdm_stem))


# SINGULARIZATION

sing <- as.data.frame(termFrequency_cons)
sing <- cbind(sing,singularize(rownames(termFrequency)))
colnames(sing)[1] <- "Ocorrencias"
colnames(sing)[2] <- "Termos"

Tabela <- as.data.frame(c(sing[2], sing[1]),,stringsAsFactors = FALSE)

Junta <- aggregate(Tabela[,c("Ocorrencias")], by=list(Tabela$Termos),
"sum")
ArquivoCSV <- paste("V04_Frequencias_Total_Junta_",format(Sys.time(),
"%Y%m%d_%H%M%S"),".csv", sep="")
write.csv2(Junta, ArquivoCSV)


# Automated Wordcloud

pal2 <- brewer.pal(8,"Dark2")
wordcloud(words = Junta$Group.1, max.words = 150, freq=Junta$x, min.freq =
1, random.order = FALSE, ordered.colors = FALSE, colors=pal2, scale = c(4,
0.2))


# Revised Wordcloud (after manual stemming)

Working_Dir  <- "C:\\Dest_Folder\\"
setwd(Working_Dir)
Word_Custom <- read.csv2("Lista_Final_150.csv", header = TRUE)
is(Word_Custom)
head (Word_Custom)
pal2 <- brewer.pal(8,"Dark2")

wordcloud(words = Word_Custom$Group.1, max.words = 50, freq=Word_Custom$x,
min.freq = 1, random.order = FALSE, ordered.colors = FALSE, colors=pal2,
scale = c(3.3, 0.18))

warnings()

# Time reporting
tac1 <- proc.time() - tic1
tac1

tac2 <- proc.time() - tic2
tac2
```

```
tac3 <- proc.time() - tic3
tac3
```

Appendices 4-10: References

1. G. C. Nobre and E. Tavares, *Scientometrics*, 2017, **111**, (1), 463 LINK https://doi.org/10.1007/s11192-017-2281-6
2. SICCODE, 'SIC Directory / SIC Code Lookup by Keyword or Code' 2018 : https://siccode.com/en/siccode/list/directory (Accessed on 12 December 2018)
3. P. Ghisellini, C. Cialani and S. Ulgiati, *J. Clean. Prod.*, 2016, **114**, 11 LINK https://doi.org/10.1016/j.jclepro.2015.09.007
4. D. Sánchez-De-Rivera, T. Robles, J. A. López, M. N. De La Cruz, A. S. De Miguel, M. S. I. Gómez, J. A. Martínez and A. F. Skarmeta, *CEUR Workshop Proc.*, 2017, **2063**,
5. T. E. Amah, M. Kamat, K. Abu Bakar, A. M. Abali, W. Moreira and A. Oliveira- Jr., *J. Sens. ACTUATOR NETWORKS*, 2017, **6**, (4), LINK https://doi.org/10.3390/jsan6040031
6. R. Stark, H. Grosser, B. Beckmann-Dobrev and S. Kind, 'Advanced Technologies in Life Cycle Engineering', in 'Procedia CIRP', Vol. 22, Elsevier, 2014 LINK https://doi.org/10.1016/j.procir.2014.07.118
7. D. K. K. Sreekantha and A. M. M. Kavya, *Proc. 2017 11th Int. Conf. Intell. Syst. Control. ISCO 2017*, 2017, 134 LINK https://doi.org/10.1109/ISCO.2017.7855968
8. X. Ji, J. Sun, Y. Wang and Q. Yuan, *J. Clean. Prod.*, 2017, **142**, (2, SI), 894 LINK https://doi.org/10.1016/j.jclepro.2016.02.117
9. M. Somayya and R. Ramaswamy, 'Amsterdam Smart City (ASC): Fishing Village to Sustainable City', in 'Sustain. CITY XI', Vol. 204, 2016 LINK https://doi.org/10.2495/SC160681
10. , *2018 3rd Int. Conf. Smart Sustain. Technol.*, 2018, 1
11. M. P. Brundage, W. Z. Bernstein, S. Hoffenson, Q. Chang, H. Nishi, T. Kliks and K. C. Morris, *J. Clean. Prod.*, 2018, **187**, 877 LINK https://doi.org/10.1016/j.jclepro.2018.03.187
12. W.-M. Wey and C.-H. Ching, 'The Application of Innovation and Catapult Research Techniques to Future Smart Cities Assessment Framework', in 'ICSSE 2018', 2018 LINK https://doi.org/10.1109/ICSSE.2018.8520043
13. M. Reid and B. Cook, 'The Application of Smart, Connected Power Plant Assets for Enhanced Condition Monitoring and Improving Equipment Reliability', in 'Am. Soc. Mech. Eng. Power Div. POWER', Vol. 2016-Janua, 2016 LINK https://doi.org/10.1115/POWER2016-59189
14. R. Mulenga, J. Kalezhi, S. K. Musonda and S. Silavwe, 'Applying Internet of Things in Monitoring and Control of an Irrigation System for Sustainable Agriculture for Small-Scale Farmers in Rural Communities', in '2018 IEEE PES/IAS PowerAfrica, PowerAfrica 2018', 2018 LINK https://doi.org/10.1109/PowerAfrica.2018.8521025

15. S. Ma, T. Xiang, Y. Wang, X. Wang, Y. Guo, K. Hou, Y. Mu and H. Jia, 'An Approach to Propose Optimal Energy Storage System in Real-Time Electricity Pricing Environments', 'Commun. Comput. Inf. Sci.', Vol. 925, 2018 LINK https://doi.org/10.1007/978-981-13-2381-2_18
16. P. I. Yakimov, 'Approaches and Instruments for Overcoming the Challenges of the Smart Grids Control', in '2016 IEEE Int. POWER Electron. MOTION Control Conf.', IEEE International Power Electronics and Motion Control Conference IPEMC IEEE, 345 E 47TH ST, NEW YORK, NY 10017 USA, 2016
17. T. . b Zhang, X. . Wang, J. . Chu, X. . Liu and P. . Cui, 'Automotive Recycling Information Management Based on the Internet of Things and RFID Technology', in 'ICAMS 2010 - Proc. 2010 IEEE Int. Conf. Adv. Manag. Sci.', Vol. 2, Chengdu, 2010 LINK https://doi.org/10.1109/ICAMS.2010.5552998
18. C. Palasciano and M. Taisch, *Proc. Summer Sch. Fr. Turco*, 2016, **13**-**15**-**Sept**, 107 LINK https://www.scopus.com/inward/record.uri?eid=2-s2.0-85006056313&partnerID=40&md5=608bb67080678434649a593f605fba1e
19. M. Kocsis, J. Buyer, N. Sussmann, R. Zoellner and G. Mogan, 'Autonomous Grocery Delivery Service in Urban Areas', in '2017 19TH IEEE Int. Conf. HIGH Perform. Comput. Commun. / 2017 15TH IEEE Int. Conf. SMART CITY / 2017 3RD IEEE Int. Conf. DATA Sci. Syst.', IEEE, 345 E 47TH ST, NEW YORK, NY 10017 USA, 2017 LINK https://doi.org/10.1109/HPCC-SmartCity-DSS.2017.24
20. J. Wang, 'Based on RFID Prefabricated Building Component Design and Monitoring System Research', 'Adv. Mater. Res.', Vol. 983, 2014 LINK https://doi.org/10.4028/www.scientific.net/AMR.983.359
21. O. B. Piramuthu and W. Zhou, 'Bicycle Sharing, Social Media, and Environmental Sustainability', in 'Proc. Annu. Hawaii Int. Conf. Syst. Sci.', Vol. 2016-March, 2016 LINK https://doi.org/10.1109/HICSS.2016.262
22. S. Bin, Y. Zhiquan, L. S. C. Jonathan, D. K. Jiewei, D. Kurle, F. Cerdas and C. Herrmann, 'A Big Data Analytics Approach to Develop Industrial Symbioses in Large Cities', in '22ND CIRP Conf. LIFE CYCLE Eng.', Procedia CIRP, ed. Kara, S, Vol. 29, ELSEVIER SCIENCE BV, SARA BURGERHARTSTRAAT 25, PO BOX 211, 1000 AE AMSTERDAM, NETHERLANDS, 2015 LINK https://doi.org/10.1016/j.procir.2015.01.066
23. Y. Zhang, S. Ren, Y. Liu and S. Si, *J. Clean. Prod.*, 2017, **142**, (2, SI), 626 LINK https://doi.org/10.1016/j.jclepro.2016.07.123
24. S. E. Bibri and J. Krogstie, 'Big Data and Context-Aware Computing Applications for Smart Sustainable Cities', in 'CEUR Workshop Proc.', Vol. 1818, 2016
25. X. Ge and J. Jackson, *SAE Int. J. Commer. Veh.*, 2014, **7**, (2), 2014 LINK

https://doi.org/10.4271/2014-01-2410

26. A. Singh, S. Kumari, H. Malekpoor and N. Mishra, *J. Clean. Prod.*, 2018, **202**, 139 LINK https://doi.org/10.1016/j.jclepro.2018.07.236
27. A. Soroka, Y. Liu, L. Han and M. S. Haleem, 'Big Data Driven Customer Insights for SMEs in Redistributed Manufacturing', in 'Procedia CIRP', Vol. 63, 2017 LINK https://doi.org/10.1016/j.procir.2017.03.319
28. S. Jia Wang and P. Moriarty, 'Big Data for Urban Sustainability: A Human-Centered Perspective', 'Big Data Urban Sustain. A Human-Centered Perspect.', 2018 LINK https://doi.org/10.1007/978-3-319-73610-5
29. N. Mansuy, *J-FOR-JOURNAL Sci. Technol. For. Prod. Process.*, 2015, **5**, (5, SI), 6
30. B.-A. Schuelke-Leech, B. Barry, M. Muratori and B. J. Yurkovich, *Renew. Sustain. ENERGY Rev.*, 2015, **52**, 937 LINK https://doi.org/10.1016/j.rser.2015.07.128
31. J. Wu, S. Guo, J. Li and D. Zeng, *IEEE Syst. J.*, 2016, **10**, (3), 888 LINK https://doi.org/10.1109/JSYST.2016.2550530
32. J. Wu, S. Guo, J. Li and D. Zeng, *IEEE Syst. J.*, 2016, **10**, (3), 873 LINK https://doi.org/10.1109/JSYST.2016.2550538
33. G. Suciu, A. Vulpe, A. Martian, S. Halunga and D. N. Vizireanu, *Wirel. Pers. Commun.*, 2016, **87**, (3), 1113 LINK https://doi.org/10.1007/s11277-015-2527-7
34. G. C. Lazaroiu and M. Roscia, 'Blockchain and Smart Metering towards Sustainable Prosumers', in 'SPEEDAM 2018 - Proc. Int. Symp. Power Electron. Electr. Drives, Autom. Motion', 2018 LINK https://doi.org/10.1109/SPEEDAM.2018.8445384
35. N. Aste, M. Manfren and G. Marenzi, *Renew. Sustain. Energy Rev.*, 2017, **75**, (September 2015), 313 LINK https://doi.org/10.1016/j.rser.2016.10.072
36. L. Bottaccioli, A. Aliberti, F. Ugliotti, E. Patti, A. Osello, E. Macii and A. Acquaviva, 'Building Energy Modelling and Monitoring by Integration of IoT Devices and Building Information Models', in 'Proc. - Int. Comput. Softw. Appl. Conf.', Vol. 1, 2017 LINK https://doi.org/10.1109/COMPSAC.2017.75
37. Y. Xue, Z. Wen, H. Bressers and N. Ai, 'Can Intelligent Collection Integrate Informal Sector for Urban Resource Recycling in China?' (2019), 2019 LINK https://doi.org/10.1016/j.jclepro.2018.10.155
38. S. Melo, J. Macedo and P. Baptista, *Transp. Policy*, 2019, **73**, 143 LINK https://doi.org/10.1016/j.tranpol.2018.07.003
39. Z. Zhang and D. Huisingh, *J. Clean. Prod.*, 2017, **142**, (2, SI), 1055 LINK https://doi.org/10.1016/j.jclepro.2016.06.199
40. A. Louhghalam, M. Akbarian and F.-J. Ulm, *J. Clean. Prod.*, 2017, **142**, (2, SI), 956 LINK https://doi.org/10.1016/j.jclepro.2016.06.198
41. A. Memon, W. Liu and A. Al-Anbuky, *Proc. - 2016 IEEE 14th Int. Conf. Dependable,*

Auton. Secur. Comput. DASC 2016, 2016 IEEE 14th Int. Conf. Pervasive Intell. Comput. PICom 2016, 2016 IEEE 2nd Int. Conf. Big Data, 2016, 947 LINK https://doi.org/10.1109/DASC-PICom-DataCom-CyberSciTec.2016.163

42. A. P. P. Fernández-Getino, J. L. L. Alonso-Prados and M. I. I. Santín-Montanyá, *Land use policy*, 2018, **71**, (September 2016), 146 LINK https://doi.org/10.1016/j.landusepol.2017.11.035
43. S. Gupta, H. Chen, B. T. B. T. Hazen, S. Kaur and E. D. R. E. D. R. E. D. R. Santibañez Gonzalez, *Technol. Forecast. Soc. Change*, 2018, (October 2017), 0 LINK https://doi.org/10.1016/j.techfore.2018.06.030
44. M.-L. Tseng, R. R. Tan, A. S. F. Chiu, C.-F. Chien and T. C. Kuo, *Resour. Conserv. Recycl.*, 2017, **131**, 146 LINK https://doi.org/10.1016/j.resconrec.2017.12.028
45. G. R. C. Andrés, 'CleanWiFi: The Wireless Network for Air Quality Monitoring, Community Internet Access and Environmental Education in Smart Cities', in 'ITU WT 2016', 2016 LINK https://doi.org/10.1109/ITU-WT.2016.7805708
46. O. Fisher, N. Watson, L. Porcu, D. Bacon, M. Rigley and R. L. Gomes, *J. Manuf. Syst.*, 2018, **47**, 53 LINK https://doi.org/10.1016/j.jmsy.2018.03.005
47. Y. C. Pranaya, M. N. Himarish, M. N. Baig and M. R. Ahmed, *2017 3Rd Int. Conf. Power Gener. Syst. andRenewable Energy Technol.*, 2017, 44 LINK https://doi.org/10.1109/PGSRET.2017.8251799
48. V. V. . Gilart-Iglesias, H. H. . Mora, R. . Pérez-delHoyo, C. . García-Mayor, R. Perez-delHoyo and C. Garcia-Mayor, *Sustain.*, 2015, **7**, (11), 14935 LINK https://doi.org/10.3390/su71114935
49. S. Heitlinger, N. Bryan-Kinns and R. Comber, 'Connected Seeds and Sensors: Co-Designing Internet of Things for Sustainable Smart Cities with Urban Food-Growing Communities', in Vol. 2, 2018 LINK https://doi.org/10.1145/3210604.3210620
50. M. Sinclair, L. Sheldrick, M. Moreno and E. Dewberry, *SUSTAINABILITY*, 2018, **10**, (6), LINK https://doi.org/10.3390/su10062088
51. S. E. Bibri and J. Krogstie, *J. Big Data*, 2017, **4**, (1), LINK https://doi.org/10.1186/s40537-017-0091-6
52. T. Hoang, P. H. Cher, P. K. Prasetyo and E.-P. Lim, 'Crowdsensing and Analyzing Micro-Event Tweets for Public Transportation Insights', in 'Proc. - 2016 IEEE Int. Conf. Big Data, Big Data 2016', 2016 LINK https://doi.org/10.1109/BigData.2016.7840845
53. J. Dumitrache, S. I. Caramihai, L. S. Sacala and M. A. Moisescu, 'A Cyber Physical Systems Approach for Agricultural Enterprise and Sustainable Agriculture', in '2017 21ST Int. Conf. Control Syst. Comput. Sci.', ed. Dumitrache, I and Florea, AM and Pop, F and Dumitrascu, A, IEEE, 345 E 47TH ST, NEW YORK, NY 10017 USA, 2017

LINK https://doi.org/10.1109/CSCS.2017.74

54. A. Seo, J. Jeong and Y. Kim, *Sensors*, 2017, **17**, (8), 1868 LINK https://doi.org/10.3390/s17081868
55. Y. Li, H. Zhang, U. Roy and Y. T. Lee, 'A Data-Driven Approach for Improving Sustainability Assessment in Advanced Manufacturing', in 'Proc. - 2017 IEEE Int. Conf. Big Data, Big Data 2017', Vol. 2018-Janua, 2018 LINK https://doi.org/10.1109/BigData.2017.8258116
56. Z. Jiao, L. Ran, Y. Zhang, Z. Li and W. Zhang, *J. Clean. Prod.*, 2018, **185**, 105 LINK https://doi.org/10.1016/j.jclepro.2018.02.255
57. V. Tanyingyong, R. Olsson, M. Hidell, P. Sjodin and B. Pehrson, 'Design and Implementation of an IoT-Controlled DC-DC Converter', in '2013 Sustain. Internet ICT Sustain. Sustain. 2013', 2013 LINK https://doi.org/10.1109/SustainIT.2013.6685199
58. X. . Lin, J. . Zhang, J. . Zhang, Y. . Chen, Y. . Zhang and Q. . Sun, 'The Design and Implementation of Energy Consumption Monitoring Platform Oriented to Public Green Buildings', in 'Proc. - 2013 4th Int. Conf. Digit. Manuf. Autom. ICDMA 2013', Qindao, Shandong, 2013 LINK https://doi.org/10.1109/ICDMA.2013.339
59. G. . Paterson, P. . Crowther and S. . Taylor, 'Design for Disassembly and Recycling-Using Radio Frequency Identification (RFID) Technology to Facilitate Whole Life Actions for Sustainable Construction', in 'CESB 2007 PRAGUE Int. Conf. - Cent. Eur. Towar. Sustain. Build.', Vol. 2, CESB 07 PRAGUE Secretariat, Prague, 2007 LINK https://www.scopus.com/inward/record.uri?eid=2-s2.0-84902578614&partnerID=40&md5=4a90b754bddfa7c632c686b135f375af
60. C. Ziogou, S. Voutetakis and S. Papadopoulou, 'Design of an Energy Decision Framework for an Autonomous RES-Enabled Smart-Grid Network', in '2016 23rd Int. Conf. Telecommun. ICT 2016', 2016 LINK https://doi.org/10.1109/ICT.2016.7500384
61. M. Nasiri, N. Tura and V. Ojanen, 'Developing Disruptive Innovations for Sustainability: A Review on Impact of Internet of Things (IOT)', in '2017 Portl. Int. Conf. Manag. Eng. Technol.', Portland International Conference on Management of Engineering and Technology, ed. Kocaoglu, DF and Anderson, TR and Daim, TU and Kozanoglu, DC and Niwa, K and Perman, G and Steenhuis, HJ, IEEE, 345 E 47TH ST, NEW YORK, NY 10017 USA, 2017
62. E. Y. C. Wong and W. H. Wong, *Sustain.*, 2017, **9**, (1), LINK https://doi.org/10.3390/su9010058
63. F. Tao, J. Cheng, Q. Qi, M. Zhang, H. Zhang and F. Sui, *Int. J. Adv. Manuf. Technol.*, 2018, **94**, (9–12), 3563 LINK https://doi.org/10.1007/s00170-017-0233-1

64. M. J. Beliatis, H. Mansour, S. Nagy, A. Aagaard and M. Presser, 'Digital Waste Management Using LoRa Network a Business Case from Lab to Fab', in '2018 Glob. Internet Things Summit, GIoTS 2018', IEEE, 2018 LINK https://doi.org/10.1109/GIOTS.2018.8534562
65. V. Salminen, H. Ruohomaa and J. Kantola, 'Digitalization and Big Data Supporting Responsible Business Co-Evolution', 'Adv. Intell. Syst. Comput.', Vol. 498, 2017 LINK https://doi.org/10.1007/978-3-319-42070-7_96
66. M. A. Reuter, *Metall. Mater. Trans. B Process Metall. Mater. Process. Sci.*, 2016, **47**, (6), 3194 LINK https://doi.org/10.1007/s11663-016-0735-5
67. O. Okorie, K. Salonitis, F. Charnley and M. Moreno, *Energies*, 2018, **11**, (11), 3009 LINK https://doi.org/10.3390/en11113009
68. Y. Guo, F. Hu, H. Allaoui and Y. Boulaksil, *Int. J. Prod. Res.*, 2018, **0**, (0), 1 LINK https://doi.org/10.1080/00207543.2018.1556412
69. M. Chong, A. Habib, N. Evangelopoulos and H. W. H. W. Park, 'Dynamic Capabilities of a Smart City: An Innovative Approach to Discovering Urban Problems and Solutions' (2018), 2018 LINK https://doi.org/10.1016/j.giq.2018.07.005
70. J. Li, X. Zeng and A. Stevels, *Crit. Rev. Environ. Sci. Technol.*, 2015, **45**, (8), 840 LINK https://doi.org/10.1080/10643389.2014.900245
71. W. Lu, X. Chen, Y. Y. Peng and X. Liu, 'The Effects of Green Building on Construction Waste Minimization: Triangulating "Big Data" with "Thick Data"' (2018), 2018 LINK https://doi.org/10.1016/j.wasman.2018.07.030
72. A. Pagoropoulos, D. C. A. Pigosso and T. C. McAloone, 'The Emergent Role of Digital Technologies in the Circular Economy: A Review', in '9TH CIRP Ind. Prod. Conf. Circ. Perspect. Prod.', Procedia CIRP, ed. McAloone, TC and Pigosso, DCA and Mortensen, NH and Shimomura, Y, Vol. 64, ELSEVIER SCIENCE BV, SARA BURGERHARTSTRAAT 25, PO BOX 211, 1000 AE AMSTERDAM, NETHERLANDS, 2017 LINK https://doi.org/10.1016/j.procir.2017.02.047
73. S. Brad and M. Murar, 'Employing Smart Units and Servitization towards Reconfigurability of Manufacturing Processes', in 'Procedia CIRP', ed. B. X. Brissaud D., Vol. 30, Elsevier, 2015 LINK https://doi.org/10.1016/j.procir.2015.02.154
74. V. Gutiérrez, D. Amaxilatis, G. Mylonas and L. Muñoz, *IEEE Internet Things J.*, 2018, **5**, (2), 668 LINK https://doi.org/10.1109/JIOT.2017.2743783
75. M. Zuccalà and E. S. Verga, *Energy Procedia*, 2017, **111**, (September 2016), 826 LINK https://doi.org/10.1016/j.egypro.2017.03.245
76. J. Hu and A. V Vasilakos, *IEEE Trans. Smart Grid*, 2016, **7**, (5), 2423 LINK https://doi.org/10.1109/TSG.2016.2563461
77. P. R. P. R. Lutui, B. Cusack and G. Maeakafa, *2018 IEEE Int. Conf. Environ. Eng. EE*

2018 - Proc., 2018, (figure 1), 1 LINK https://doi.org/10.1109/EE1.2018.8385277

78. N. P. Melville and O. Zik, 'Energy Points: A New Approach to Optimizing Strategic Resources by Leveraging Big Data', in 'Proc. 49TH Annu. HAWAII Int. Conf. Syst. Sci. (HICSS 2016)', Proceedings of the Annual Hawaii International Conference on System Sciences, ed. Bui, TX and Sprague, RH, Vol. 2016-March, IEEE COMPUTER SOC, 10662 LOS VAQUEROS CIRCLE, PO BOX 3014, LOS ALAMITOS, CA 90720-1264 USA, 2016 LINK https://doi.org/10.1109/HICSS.2016.132
79. J. R. Galvão, L. Moreira, G. Gaspar, S. Vindeirinho and S. Leitão, *Manag. Environ. Qual. An Int. J.*, 2017, **28**, (3), 302 LINK https://doi.org/10.1108/MEQ-02-2014-0028
80. J. R. Galvao, L. M. Moreira, R. M. T. Ascenso and S. A. Leitao, 'Energy Systems Models for Efficiency towards Smart Cities', in 'EUROCON 2015', 2015 LINK https://doi.org/10.1109/EUROCON.2015.7313682
81. F. Desprez, S. Ibrahim, A. Lebre, A. C. A.-C. Orgerie, J. Pastor and A. Simonet, 'Energy-Aware Massively Distributed Cloud Facilities: The DISCOVERY Initiative', in '2015 IEEE Int. Conf. Data Sci. Data Intensive Syst.', 2015 LINK https://doi.org/10.1109/DSDIS.2015.58
82. M. Reid and T. File, 'Enhancement of an Equipment Reliability Program With Smart, Connected Power Plant Assets', in 'Proc. ASME 2017 Power Conf. Jt. With ICOPE-17', Vol. 2, 2017 LINK https://doi.org/10.1115/POWER-ICOPE2017-3269
83. J. K. W. K. W. J. K. W. Wong and J. Zhou, *Autom. Constr.*, 2015, **57**, 156 LINK https://doi.org/10.1016/j.autcon.2015.06.003
84. G. Correndo, S. Crowle, J. Papay and M. Boniface, 'Enhancing Marine Industry Risk Management through Semantic Reconciliation of Underwater IoT Data Streams', in 'ACM Int. Conf. Proceeding Ser.', Vol. 13-14-Sept, 2016 LINK https://doi.org/10.1145/2993318.2993330
85. H. Yu and W. D. Solvang, 'Enhancing the Competitiveness of Manufacturers through Small-Scale Intelligent Manufacturing System (SIMS): A Supply Chain Perspective', in '2017 6TH Int. Conf. Ind. Technol. Manag.', IEEE, 345 E 47TH ST, NEW YORK, NY 10017 USA, 2017 LINK https://doi.org/10.1109/ICITM.2017.7917904
86. J.-W. W. Lu, N.-B. Bin Chang and L. Liao, *Crit. Rev. Environ. Sci. Technol.*, 2013, **43**, (15), 1557 LINK https://doi.org/10.1080/10643389.2012.671097
87. F. Stiel and F. Teuteberg, 'Environmental-Oriented Information Systems Design-The Concept of Life Cycle Impact Modelling and Its Application to Cloud Computing', in 'Lect. Notes Informatics (LNI), Proc. - Ser. Gesellschaft Fur Inform.', ed. U. D. S. E. Plodereder E. Grunske L., Vol. P-232, Gesellschaft fur Informatik (GI), 2014 LINK https://www.scopus.com/inward/record.uri?eid=2-s2.0-

84922567202&partnerID=40&md5=3681943e77fd57b854a7396186ce56c0

88. N. Pirrone, S. Cinnirella, S. Nativi, F. Sprovieri and I. M. M. Hedgecock, *Int. Arch. Photogramm. Remote Sens. Spat. Inf. Sci. - ISPRS Arch.*, 2016, **41**, (July), 1349 LINK https://doi.org/10.5194/isprsarchives-XLI-B8-1349-2016
89. L. Li, T. Hao and T. Chi, *J. Clean. Prod.*, 2016, **142**, 513 LINK https://doi.org/10.1016/j.jclepro.2016.02.078
90. R. Dubey, A. Gunasekaran, S. J. Childe, Z. Luo, S. F. Wamba, D. Roubaud and C. Foropon, *J. Clean. Prod.*, 2018, **196**, 1508 LINK https://doi.org/10.1016/j.jclepro.2018.06.097
91. G. Bressanelli, F. Adrodegari, M. Perona and N. Saccani, *SUSTAINABILITY*, 2018, **10**, (3), LINK https://doi.org/10.3390/su10030639
92. S. E. Bibri, *Sustain. Cities Soc.*, 2018, **38**, 758 LINK https://doi.org/10.1016/j.scs.2017.12.032
93. Y. Zhang, S. Ren, Y. Liu, T. Sakao and D. Huisingh, *J. Clean. Prod.*, 2017, **159**, 229 LINK https://doi.org/10.1016/j.jclepro.2017.04.172
94. L. Gervasoni, M. Bosch, S. Fenet and P. Sturm, 'A Framework for Evaluating Urban Land Use Mix from Crowd-Sourcing Data', in 'Proc. - 2016 IEEE Int. Conf. Big Data, Big Data 2016', 2016 LINK https://doi.org/10.1109/BigData.2016.7840844
95. I. Askoxylakis, 'A Framework for Pairing Circular Economy and the Internet of Things', in 'IEEE Int. Conf. Commun.', Vol. 2018-May, 2018 LINK https://doi.org/10.1109/ICC.2018.8422488
96. V. Salminen, H. Ruohomaa and T. Poykko, 'FROM SUPPLY CHAIN TO DIGITAL CIRCULAR VALUE CHAIN', in '2016 Int. Conf. Prod. Res. - Reg. Conf. AFRICA, Eur. MIDDLE EAST (ICPR-AEM 2016) 4TH Int. Conf. Qual. Innov. Eng. Manag. (QIEM 2016)', ed. Popescu, D, TECHNICAL UNIV CLUJ-NAPOCA, 28 MEMORANDUMULUI STREET, CLUJ-NAPOCA, 400114, ROMANIA, 2016
97. Y. Zhang, J. Wang and Y. Liu, *J. Clean. Prod.*, 2017, **167**, 665 LINK https://doi.org/10.1016/j.jclepro.2017.08.068
98. Y. Kim, T.-W. Chang and J. Park, *Sustain.*, 2017, **9**, (11), LINK https://doi.org/10.3390/su9111995
99. A.-N. El-Kassar and S. K. Singh, *Technol. Forecast. Soc. Change*, 2018, LINK https://doi.org/10.1016/j.techfore.2017.12.016
100. R. Arshad, S. Zahoor, M. A. Shah, A. Wahid and H. Yu, *IEEE ACCESS*, 2017, **5**, (c), 15667 LINK https://doi.org/10.1109/ACCESS.2017.2686092
101. D. Boll, J. De Vos, F. Botman, G. De Streel, S. Bernard, D. Flandre and J.-D. Legat, 'Green SoCs for a Sustainable Internet-of-Things', in '2013 IEEE Faibl. Tens. Faibl. Consomm. FTFC 2013', Paris, 2013 LINK

https://doi.org/10.1109/FTFC.2013.6577767

102. B. Delinchant, F. Wurtz, S. Ploix, J.-L. Schanen and Y. Marechal, 'GreEn-ER Living Lab : A Green Building with Energy Aware Occupants', in 'SMARTGREENS 2016 - Proc. 5th Int. Conf. Smart Cities Green ICT Syst.', 2016
103. J. Shuja, R. W. Ahmad, A. Gani, A. I. Abdalla Ahmed, A. Siddiqa, K. Nisar, S. U. Khan, A. Y. Zomaya, A. I. A. Ahmed, A. Siddiqa, K. Nisar, S. U. Khan and A. Y. Zomaya, *J. INTERNET Serv. Appl.*, 2017, **8**, (1), LINK https://doi.org/10.1186/s13174-017-0060-5
104. D. Kalisch, S. Braun and A. von Radecki, 'A Holistic Approach to Understand Urban Complexity: A Case Study Analysis of New York City', 'Lect. Notes Comput. Sci. (Including Subser. Lect. Notes Artif. Intell. Lect. Notes Bioinformatics)', Vol. 9860 LNCS, 2016 LINK https://doi.org/10.1007/978-3-662-53416-8_3
105. C. J. Corbett, *Prod. Oper. Manag.*, 2018, LINK https://doi.org/10.1111/poms.12837
106. F. Sotiropoulos, *J. Hydraul. Res.*, 2015, **53**, (5), 547 LINK https://doi.org/10.1080/00221686.2015.1119210
107. P. Sajhau, *F. Actions Sci. Rep.*, 2017, **2017**, (Special Is), 52
108. S. E. S. E. Bibri and J. Krogstie, *Sustain. Cities Soc.*, 2017, **32**, (7030), 449 LINK https://doi.org/10.1016/j.scs.2017.04.012
109. K. Kim, J.-K. Jung and J. Y. Choi, *SUSTAINABILITY*, 2016, **8**, (7), LINK https://doi.org/10.3390/su8070649
110. I. B. . Aris, R. K. Z. . Sahbusdin and A. F. M. . Amin, 'Impacts of IoT and Big Data to Automotive Industry', in '2015 10th Asian Control Conf. Emerg. Control Tech. a Sustain. World, ASCC 2015', ed. F. A. A. M. R. R. Z. A. I. A. J. S. A. C. A. S. A. Selamat H. Ramli H.R.H., Institute of Electrical and Electronics Engineers Inc., 2015 LINK https://doi.org/10.1109/ASCC.2015.7244878
111. H. Shahrokni, L. Arman, D. Lazarevic, A. Nilsson, N. Brandt, L. Årman, D. Lazarevic, A. Nilsson and N. Brandt, *J. Ind. Ecol.*, 2015, **19**, (5), 917 LINK https://doi.org/10.1111/jiec.12308
112. G. Hatzivasilis, K. Fysarakis, O. Soultatos, I. Askoxylakis, I. Papaefstathiou and G. Demetriou, *Comput. Commun.*, 2018, **119**, 127 LINK https://doi.org/10.1016/j.comcom.2018.02.007
113. S. Al-Rubaye, E. Kadhum, Q. Ni and A. Anpalagan, *IEEE Internet Things J.*, 2017, LINK https://doi.org/10.1109/JIOT.2017.2734903
114. B. Song, Z. Yeo, P. Kohls and C. Herrmann, 'Industrial Symbiosis: Exploring Big-Data Approach for Waste Stream Discovery', in 'Procedia CIRP', Vol. 61, 2017 LINK https://doi.org/10.1016/j.procir.2016.11.245
115. A. B. A. B. Lopes de Sousa Jabbour, C. J. C. C. J. C. Jabbour, M. Godinho Filho and

D. Roubaud, *Ann. Oper. Res.*, 2018, 1 LINK https://doi.org/10.1007/s10479-018-2772-8

116. X. Su, G. Shao, J. Vause and L. Tang, *Int. J. Sustain. Dev. WORLD Ecol.*, 2013, **20**, (3, SI), 205 LINK https://doi.org/10.1080/13504509.2013.782580
117. P. Aggarwal, B. Chen and J. Harper, *SAE Tech. Pap.*, 2017, **2017**-**March**, (March), LINK https://doi.org/10.4271/2017-01-1702
118. F. AlFaris, A. Juaidi and F. Manzano-Agugliaro, *Energy Build.*, 2017, **153**, 262 LINK https://doi.org/10.1016/j.enbuild.2017.07.089
119. C. Choi, C. Esposito, H. Wang, Z. Liu and J. Choi, *IEEE Commun. Mag.*, 2018, **56**, (7), 212 LINK https://doi.org/10.1109/MCOM.2018.1700880
120. F. Tao, Y. Zuo, L. Da Xu, L. Lv and L. Zhang, *IEEE Trans. Ind. INFORMATICS*, 2014, **10**, (2), 1252 LINK https://doi.org/10.1109/TII.2014.2306771
121. Y. Zuo, F. Tao and A. Y. C. Nee, *Int. J. Comput. Integr. Manuf.*, 2017, **00**, (00), 1 LINK https://doi.org/10.1080/0951192X.2017.1285429
122. G. Knieps, *Compet. Regul. Netw. Ind.*, 2017, **18**, (1–2), 115 LINK https://doi.org/10.1177/1783591717736502
123. Y. Zhang, S. Liu, Y. Liu, H. Yang, M. Li, D. Huisingh and L. Wang, *J. Clean. Prod.*, 2018, **185**, 562 LINK https://doi.org/10.1016/j.jclepro.2018.02.061
124. J. C. Ferreira, 'Internet of Things for Energy Efficiency and Personalization', in 'Intell. Environ. 2016', Ambient Intelligence and Smart Environments, ed. Novais, P and Konomi, S, Vol. 21, IOS PRESS, NIEUWE HEMWEG 6B, 1013 BG AMSTERDAM, NETHERLANDS, 2016 LINK https://doi.org/10.3233/978-1-61499-690-3-456
125. L. Liu, *Energy Procedia*, 2018, **153**, 342 LINK https://doi.org/10.1016/j.egypro.2018.10.080
126. S. E. S. E. Bibri, *Sustain. Cities Soc.*, 2018, **38**, (December 2017), 230 LINK https://doi.org/10.1016/j.scs.2017.12.034
127. S. Liu, G. Zhang and L. Wang, 'IoT-Enabled Dynamic Optimisation for Sustainable Reverse Logistics', in 'Procedia CIRP', Vol. 69, 2018 LINK https://doi.org/10.1016/j.procir.2017.11.088
128. X. . Peng, D. . Deng, S. . Cheng, J. . Wen, Z. . Li and L. . Niu, *Zhongguo Dianji Gongcheng Xuebao/Proceedings Chinese Soc. Electr. Eng.*, 2015, **35**, (3), 503 LINK https://doi.org/10.13334/j.0258-8013.pcsee.2015.03.001
129. R. Saracco, *Elektroteh. Vestnik/Electrotechnical Rev.*, 2012, **79**, (5), 255 LINK https://www.scopus.com/inward/record.uri?eid=2-s2.0-84874534746&partnerID=40&md5=d26bc5d8466e46c0f77130ce307a6af0
130. P. Brendan 2016, 250
131. P. . Papageorgas, D. . Piromalis, T. . Valavanis, S. . Kambasis, T. . Iliopoulou and G.

. Vokas, 'A Low-Cost and Fast PV I-V Curve Tracer Based on an Open Source Platform with M2M Communication Capabilities for Preventive Monitoring', in 'Energy Procedia', Vol. 74, Elsevier Ltd, 2015 LINK https://doi.org/10.1016/j.egypro.2015.07.641

132. M. Holgado, S. Evans, M. Benedetti, M. Dubois, Y. Li, D. Morgan and E. Ferrera (n.d.) **2**, 51 LINK https://doi.org/10.1007/978-3-030-04290-5
133. O. Okorie, K. Salonitis, F. Charnley and M. Moreno, 'Manufacturing Data for the Implementation of Data-Driven Remanufacturing for the Rechargeable Energy Storage System in Electric Vehicles', Vol. 1, Springer International Publishing LINK https://doi.org/10.1007/978-3-030-04290-5
134. O. H. Abdelrahman, *Probab. Eng. Informational Sci.*, 2017, **31**, (4), 505 LINK https://doi.org/10.1017/S0269964817000158
135. I. A. . Halepoto, A. A. . Sahito, M. A. . Uqaili, B. S. . Chowdhry and T. . Riaz, 'Multi-Criteria Assessment of Smart City Transformation Based on SWOT Analysis', in '2015 5th Natl. Symp. Inf. Technol. Towar. New Smart World, NSITNSW 2015', Institute of Electrical and Electronics Engineers Inc., 2015 LINK https://doi.org/10.1109/NSITNSW.2015.7176412
136. I. Y. Lu, T. Kuo, T. S. Lin, G. H. Tzeng and S. L. Huang, *Sustain.*, 2016, **8**, (7), LINK https://doi.org/10.3390/su8070646
137. F. Shrouf, B. Gong and J. Ordieres-Meré, *J. Clean. Prod.*, 2017, **142**, 2570 LINK https://doi.org/10.1016/j.jclepro.2016.11.019
138. K. McIntyre and J. A. A. Ortiz, 'Multinational Corporations and the Circular Economy: How Hewlett Packard Scales Innovation and Technology in Its Global Supply Chain', 'Tak. Stock Ind. Ecol.', Springer International Publishing, 2015 LINK https://doi.org/10.1007/978-3-319-20571-7_17
139. J. Lindstrom, A. Hermanson, F. Blomstedt, P. Kyosti, J. Lindström, A. Hermanson, F. Blomstedt and P. Kyösti, *Appl. Sci.*, 2018, **8**, (2), LINK https://doi.org/10.3390/app8020316
140. J. E. Fischer, J. A. Colley, E. Luger, M. Golembewski, E. Costanza, S. D. Ramchurn, S. Viller, I. Oakley and J. E. Froehlich, 'New Horizons for the IoT in Everyday Life: Proactive, Shared, Sustainable', in 'UbiComp 2016 Adjun.', 2016 LINK https://doi.org/10.1145/2968219.2968347
141. K. Wang and D. Cao, 'A New Path Explore of City's Digit Management', in '2010 6TH Int. Conf. Wirel. Commun. Netw. Mob. Comput.', International Conference on Wireless Communications Networking and Mobile Computing-WiCOM IEEE, 345 E 47TH ST, NEW YORK, NY 10017 USA, 2010
142. A. Bianchini, M. Pellegrini, J. Rossi and C. Saccani 2017, 221

143. C. C. Huang, T. L. B. Tseng and M. X. Zhou, *Proc. 2015 Sci. Inf. Conf. SAI 2015*, 2015, 1427 LINK https://doi.org/10.1109/SAI.2015.7237334
144. W. Li, T. Yang, F. C. F. C. F. C. Delicato, P. F. P. F. Pires, Z. Tari, S. U. S. U. Khan and A. Y. A. Y. Zomaya, *IEEE Commun. Mag.*, 2018, **56**, (5), 94 LINK https://doi.org/10.1109/MCOM.2018.1700888
145. T. Dang Hoa and D.-S. Kim, 'On Exploiting Wireless Sensor Networks for Enhancing the Logistics Operation Efficiency in the Physical Internet', in 'Proc. - 2018 2nd Int. Conf. Recent Adv. Signal Process. Telecommun. Comput. SIGTELCOM 2018', Vol. 2018-Janua, 2018 LINK https://doi.org/10.1109/SIGTELCOM.2018.8325797
146. S. Dana Kathrin Tomic and A. Fensel, 'OpenFridge: A Platform for Data Economy for Energy Efficiency Data', in 'Proc. - 2013 IEEE Int. Conf. Big Data, Big Data 2013', 2013 LINK https://doi.org/10.1109/BigData.2013.6691686
147. P. W. P. W. Kim, *Sustain. Cities Soc.*, 2018, **37**, (September 2017), 1 LINK https://doi.org/10.1016/j.scs.2017.10.019
148. P. Ifaei, A. Farid and C. Yoo, *ENERGY*, 2018, **158**, 357 LINK https://doi.org/10.1016/j.energy.2018.06.043
149. Z. Zhou, Y. Cai, Y. Xiao, X. Chen and H. Zeng, *J. Intell. FUZZY Syst.*, 2018, **34**, (2), 807 LINK https://doi.org/10.3233/JIFS-169374
150. S. Kubler, K. Främling and W. Derigent, *Comput. Ind.*, 2015, **66**, 82 LINK https://doi.org/10.1016/j.compind.2014.10.009
151. B. T. Hazen, C. A. Boone, Y. Wang and K. S. Khor, *J. Clean. Prod.*, 2017, **142**, (2, SI), 716 LINK https://doi.org/10.1016/j.jclepro.2016.05.099
152. C. Joshi, J. Seay and N. Banadda 2018, 1 LINK https://doi.org/10.1002/ep.13086
153. J. . b J. J. . b Zhao, X. Zheng, R. R. . Dong and G. . G. G. . Shao, *Int. J. Sustain. Dev. World Ecol.*, 2013, **20**, (3, SI), 195 LINK https://doi.org/10.1080/13504509.2013.784882
154. S. F. Oliveira and A. L. Soares, 'A PLM Vision for Circular Economy', 'IFIP Adv. Inf. Commun. Technol.', Vol. 506, 2017 LINK https://doi.org/10.1007/978-3-319-65151-4_52
155. C. Choi, E. Y. Kim, E. J. Lee, S. M. Kim and N. G. Lee, *2017 IEEE SmartWorld Ubiquitous Intell. Comput. Adv. Trust. Comput. Scalable Comput. Commun. Cloud Big Data Comput. Internet People Smart City Innov. SmartWorld/SCALCOM/UIC/ATC/CBDCom/IOP/SCI 2017 -* , 2018, 1 LINK https://doi.org/10.1109/UIC-ATC.2017.8397399
156. A. Omairi, Z. H. Z. H. Ismail, K. A. K. A. Danapalasingam and M. Ibrahim, *IEEE INTERNET THINGS J.*, 2017, **4**, (6), 2104 LINK https://doi.org/10.1109/JIOT.2017.2768410

157. R. I. Muhamedyev, A. D. Giyenko, V. T. Pyagai and K. Bostanbekov, 'Premises for the Creation of Renewable Energy Sources GIS Monitoring', in '2014 IEEE 8th Int. Conf. Appl. Inf. Commun. Technol.', International Conference on Application of Information and Communication Technologies IEEE, 345 E 47TH ST, NEW YORK, NY 10017 USA, 2014
158. M. Spring and L. Araujo, *Ind. Mark. Manag.*, 2017, **60**, 126 LINK https://doi.org/10.1016/j.indmarman.2016.07.001
159. P. Poizot, F. Dolhem and J. J. Gaubicher, *Curr. Opin. Electrochem.*, 2018, **9**, 70 LINK https://doi.org/10.1016/j.coelec.2018.04.003
160. A. Laszka, A. Dubey, M. Walker and D. Schmidt, 'Providing Privacy, Safety, and Security in IoT-Based Transactive Energy Systems Using Distributed Ledgers', in 'ACM Int. Conf. Proceeding Ser.', 2017 LINK https://doi.org/10.1145/3131542.3131562
161. L. Guo, Z. Ning and W. Hou 2018, 1
162. Z. Yingfeng, L. Sichao, L. Yang and L. Miao, 'Real-Time Production Scheduling Method for Automobile Engine Remanufacturing Based on the Internet of Manufacturing Things', in 'Proc. 11TH Int. Conf. Innov. Manag. VOLS I II', ed. Yang, L and Kantola, J and de Hoyas, A and Kaminishi, K and Duysters, G, WUHAN UNIV TECHNOLOGY PRESS, 122 LUOSHI RD, WUHAN 430070, PEOPLES R CHINA, 2014
163. P. Ifaei, A. Karbassi, S. Lee and C. Yoo, *Energy Convers. Manag.*, 2017, **153**, 257 LINK https://doi.org/10.1016/j.enconman.2017.10.014
164. D. Anggraini, N. Effendy, M. Ihsan Al Hafiz and D. Ojeda Luviano, 'Research and Development of a Power Monitoring System for the Sustainable Energy Management System Implementation at Green School, Bali, Indonesia', in Vol. 43, 2018 LINK https://doi.org/10.1051/e3sconf/20184301021
165. Z. Guo, K. Zhou, C. Zhang, X. Lu, W. Chen and S. Yang, *Renew. Sustain. ENERGY Rev.*, 2018, **81**, (1), 399 LINK https://doi.org/10.1016/j.rser.2017.07.046
166. P. X. W. Zou, X. Xu, J. Sanjayan and J. Wang, 'Review of 10 Years Research on Building Energy Performance Gap: Life-Cycle and Stakeholder Perspectives' (2018), 2018 LINK https://doi.org/10.1016/j.enbuild.2018.08.040
167. E. Manavalan and K. Jayakrishna, *Comput. Ind. Eng.*, 2018, (November), LINK https://doi.org/10.1016/j.cie.2018.11.030
168. T. L. Vasques, P. Moura and A. de Almeida, *Energy Effic.*, 2018, LINK https://doi.org/10.1007/s12053-018-9753-2
169. G. Bressanelli, F. Adrodegari, M. Perona and N. Saccani, *Procedia CIRP*, 2018, **73**, 216 LINK https://doi.org/10.1016/j.procir.2018.03.322
170. S. Sim, H. King and E. Price, 'The Role of Science in Shaping Sustainable Business:

Unilever Case Study', 'Tak. Stock Ind. Ecol.', Springer International Publishing, 2015 LINK https://doi.org/10.1007/978-3-319-20571-7_15

171. P. T. T. Kidd, *Int. J. RF Technol. Res. Appl.*, 2012, **3**, (1), 67 LINK https://doi.org/10.3233/RFT-2011-017
172. A. Basak, S. Hosein, O. Mengshoel and R. Martin, 'Scalable Causal Learning for Predicting Adverse Events in Smart Buildings', in 'AAAI Work. - Tech. Rep.', Vol. WS-16-01-, 2016
173. R. Jin, H. Yuan and Q. Chen, *Resour. Conserv. Recycl.*, 2019, **140**, (May 2018), 175 LINK https://doi.org/10.1016/j.resconrec.2018.09.029
174. A. Ahmed, I. Hassan, P. Song, M. Gamaleldin, A. Radhi, N. Panwar, S. C. S. C. Tjin, A. Y. A. Y. Desoky, D. Sinton, K.-T. K.-T. Yong and J. Zu, *Sci. Rep.*, 2017, **7**, (1), LINK https://doi.org/10.1038/s41598-017-17453-4
175. P. Pilgerstorfer and E. Pournaras, 'Self-Adaptive Learning in Decentralized Combinatorial Optimization - A Design Paradigm for Sharing Economies', in 'SEAMS 2017', 2017 LINK https://doi.org/10.1109/SEAMS.2017.8
176. B. Camus, A. Blavette, F. Dufossé, A.-C. A.-C. Orgerie, F. Dufosse and A.-C. A.-C. Orgerie, *2018 IEEE Int. Conf. Clust. Comput.*, 2018, **2018-Septe**, 1 LINK https://doi.org/10.1109/CLUSTER.2018.00055
177. J. M. Field, L. Victorino, R. W. Buell, M. J. Dixon, S. M. Goldstein, L. J. Menor, M. E. Pullman, A. V. Roth, E. Secchi, J. J. Zhang, S. Meyer Goldstein, L. J. Menor, M. E. Pullman, A. V. Roth, E. Secchi and J. J. Zhang, *J. Serv. Manag.*, 2018, **29**, (1), 55 LINK https://doi.org/10.1108/JOSM-08-2017-0191
178. J.-W. Lu, N.-B. Chang, F. Zhu, J. Hai and L. Liao, 'Smart and Green Urban Solid Waste Collection System for Differentiated Collection with Integrated Sensor Networks', in 'ICNSC 2018 - 15th IEEE Int. Conf. Networking, Sens. Control', 2018 LINK https://doi.org/10.1109/ICNSC.2018.8361307
179. P. Laconte, 'Smart and Sustainable Cities: What Is Smart?—What Is Sustainable?', 'Green Energy Technol.', 2018 LINK https://doi.org/10.1007/978-3-319-75774-2_1
180. S. Madakam and R. Ramaswamy, 'Smart Cities {[}Meixi (China) x Kochi (India)] Notions (Sustainable Management Action Resource Tools for Cities)', in 'Adv. Comput. Commun. Technol.', Vol. 452, 2016 LINK https://doi.org/10.1007/978-981-10-1023-1_27
181. C. Lim, K.-J. Kim and P. P. Maglio, *CITIES*, 2018, **82**, 86 LINK https://doi.org/10.1016/j.cities.2018.04.011
182. M. Deakin and A. Reid, *J. Clean. Prod.*, 2018, **173**, 39 LINK https://doi.org/10.1016/j.jclepro.2016.12.054
183. M. . Roscia, M. . Longo and G. C. . Lazaroiu, 'Smart City by Multi-Agent Systems', in

'ICRERA 2013', IEEE Computer Society, Madrid, 2013 LINK https://doi.org/10.1109/ICRERA.2013.6749783

184. A. Kalašová, K. Čulik and S. Kubíková, 'Smart City-Model of Sustainable Development of Cities', in '11th Int. Sci. Tech. Conf. Automot. Safety, Automot. Saf. 2018', 2018 LINK https://doi.org/10.1109/AUTOSAFE.2018.8373309
185. A. Kusiak, *Int. J. Prod. Res.*, 2018, **56**, (1–2), 508 LINK https://doi.org/10.1080/00207543.2017.1351644
186. I. Lobachev and E. Cretu, 'Smart Sensor Network for Smart Buildings', in '7TH IEEE Annu. Inf. Technol. Electron. Mob. Commun. Conf. IEEE IEMCON-2016', ed. Chakrabarti, S and Saha, HN, IEEE, 345 E 47TH ST, NEW YORK, NY 10017 USA, 2016
187. S. E. S. E. Bibri and J. Krogstie, *Sustain. Cities Soc.*, 2017, **31**, 183 LINK https://doi.org/10.1016/j.scs.2017.02.016
188. E. G. Hansen, A. Alcayaga and E. G. Hansen, ed. Bakker, C and Mugge, R,*Plate 2017*, 2017, (November), 10 LINK https://doi.org/10.3233/978-1-61499-820-4-10
189. C. Chelmis, K. Rajgopal and V. K. Prasanna, 'Software Defined Connected Prosumer Communities', in '2016 IEEE 3rd World Forum Internet Things, WF-IoT 2016', IEEE, 345 E 47TH ST, NEW YORK, NY 10017 USA, 2017 LINK https://doi.org/10.1109/WF-IoT.2016.7845445
190. S. Tseng, J. Li, M. Lee, B. Wang, F. Ji and B. Bai, *Proc. 2017 CHINA Int. Electr. ENERGY Conf. (CIEEC 2017)*, 2017, **2017**, 737 LINK https://doi.org/10.1109/CIEEC.2017.8388541
191. D. Katikaridis, D. Bechtsis, I. Menexes, K. Liakos, D. Vlachos and D. Bochtis, 'A Software Tool for Efficient Agricultural Logistics', in 'CEUR Workshop Proc.', Vol. 2030, 2017
192. R. Olszewski, P. Pałka and A. Turek, *Sensors (Switzerland)*, 2018, **18**, (1), LINK https://doi.org/10.3390/s18010141
193. P. Jatinkumar Shah, T. Anagnostopoulos, A. Zaslavsky, S. Behdad, P. J. Shah, T. Anagnostopoulos, A. Zaslaysky and S. Behdad, *WASTE Manag.*, 2018, **78**, 104 LINK https://doi.org/10.1016/j.wasman.2018.05.019
194. J. Zhan, J. Huang, L. Niu, X. Peng, D. Deng and S. Cheng, 'Study of the Key Technologies of Electric Power Big Data and Its Application Prospects in Smart Grid', in '2014 IEEE PES ASIA-PACIFIC POWER ENERGY Eng. Conf. (IEEE PES APPEEC)', Asia-Pacific Power and Energy Engineering Conference IEEE, 345 E 47TH ST, NEW YORK, NY 10017 USA, 2014
195. H.-T. Wu, Y.-J. Su and W.-C. Hu, 'A Study on Blockchain-Based Circular Economy Credit Rating System', 'Adv. Intell. Syst. Comput.', Vol. 733, 2018 LINK

https://doi.org/10.1007/978-3-319-76451-1_32

196. A. Kaleel Ahmed, C. B. Senthilkumar and S. Nallusamy, *Int. J. Mech. Prod. Eng. Res. Dev.*, 2018, **8**, (1), 1245
197. M. Jang, R. Ryu and Y. Kim, *Int. J. Adv. Sci. Technol.*, 2018, **112**, 101 LINK https://doi.org/10.14257/ijast.2018.112.10
198. M. Moness and A. M. Moustafa, *IEEE Internet Things J.*, 2016, **3**, (2), 134 LINK https://doi.org/10.1109/JIOT.2015.2478381
199. G. Beier, S. Niehoff, T. Ziems and B. Xue, *Int. J. Precis. Eng. Manuf. - Green Technol.*, 2017, **4**, (2), 227 LINK https://doi.org/10.1007/s40684-017-0028-8
200. N. . b Zhang and Z. . Chen, *J. Clean. Prod.*, 2016, **142**, 642 LINK https://doi.org/10.1016/j.jclepro.2016.02.052
201. B. D. Radhakrishnan, J. Reeves, J. J. Ninteman and C. Hahm, 'Sustainability Intelligence: Emergence and Use of Big Data for Sustainable Urban Planning', in 'ASEE Annu. Conf. Expo. Conf. Proc.', Vol. 2016-June, 2016
202. S. Chandrasekaran and I. Song, 'Sustainability of Big Data Servers under Rapid Changes of Technology', 'Lect. Notes Electr. Eng.', Vol. 376, 2016 LINK https://doi.org/10.1007/978-981-10-0557-2_15
203. K. . Främling, J. . Holmström, J. . Loukkola, J. . Nyman and A. . Kaustell, *Eng. Appl. Artif. Intell.*, 2013, **26**, (2), 789 LINK https://doi.org/10.1016/j.engappai.2012.08.012
204. K. J. K. J. Chalvatzis, H. Malekpoor, N. Mishra, F. Lettice and S. Choudhary, *Technol. Forecast. Soc. Change*, 2018, (November 2017), 0 LINK https://doi.org/10.1016/j.techfore.2018.04.031
205. D. Xia, Q. Yu, Q. Gao and G. Cheng, *J. Clean. Prod.*, 2017, **141**, 1337 LINK https://doi.org/10.1016/j.jclepro.2016.09.083
206. D. J. Rosa-Gallardo, G. Ortiz, J. Boubeta-Puig and A. García-De-Prado, 'Sustainable WAsTe Collection (SWAT): One Step Towards Smart and Spotless Cities', in 'Lect. Notes Comput. Sci. (Including Subser. Lect. Notes Artif. Intell. Lect. Notes Bioinformatics)', Vol. 10797 LNCS, 2018 LINK https://doi.org/10.1007/978-3-319-91764-1_18
207. M. Khanna, S. M. Swinton and K. D. Messer, *Appl. Econ. Perspect. Policy*, 2018, **40**, (1), 38 LINK https://doi.org/10.1093/aepp/ppx055
208. L. Kang, H. L. Du, H. Zhang and W. L. Ma, *Complexity*, 2018, LINK https://doi.org/10.1155/2018/6703908
209. L. L. Tombido, L. Louw and J. van Eeden, *South African J. Ind. Eng.*, 2018, **29**, (3), 235 LINK https://doi.org/10.7166/29-3-2062
210. T. C. Kuo and S. Smith, *J. Clean. Prod.*, 2018, **192**, 207 LINK

https://doi.org/10.1016/j.jclepro.2018.04.212

211. M. Song, R. Fisher and Y. Kwoh, *Technol. Forecast. Soc. Change*, 2018, (xxxx), LINK https://doi.org/10.1016/j.techfore.2018.07.055
212. R. Munjal, W. Liu, X. J. X. J. Li, J. Gutierrez and P. H. J. P. H. J. Chong, 'Telco Asks Transp: Can You Give Me A Ride In the Era of Big Data?', in '2017 IEEE Conf. Comput. Commun. Work. (INFOCOM WKSHPS)', IEEE Conference on Computer Communications Workshops IEEE, 345 E 47TH ST, NEW YORK, NY 10017 USA, 2017 LINK https://doi.org/10.1109/INFCOMW.2017.8116473
213. E. Ferrera, R. Rossini, A. J. Baptista, S. Evans, G. G. Hovest, M. Holgado, E. Lezak, E. J. Lourenço, Z. Masluszczak, A. Schneider, E. J. Silva, O. Werner-Kytölä and M. A. Estrela, 'Toward Industry 4.0: Efficient and Sustainable Manufacturing Leveraging MAESTRI Total Efficiency Framework', 'Smart Innov. Syst. Technol.', Vol. 68, 2017 LINK https://doi.org/10.1007/978-3-319-57078-5_59
214. L. Liu, H. Sun, C. Li, Y. Hu, N. Zheng and T. Li, 'Towards an Adaptive Multi-Power-Source Datacenter', in 'Proc. Int. Conf. Supercomput.', Vol. 01-03-June, 2016 LINK https://doi.org/10.1145/2925426.2926276
215. D. Romero and O. Noran, *IFAC-PapersOnLine*, 2017, **50**, (1), 11719 LINK https://doi.org/10.1016/j.ifacol.2017.08.1944
216. G. Xu, W. Yu, D. Griffith, N. Golmie and P. Moulema, *IEEE Internet Things J.*, 2017, **4**, (1), 192 LINK https://doi.org/10.1109/JIOT.2016.2640563
217. C. Li, Y. Hu, L. Liu, J. Gu, M. Song, X. Liang, J. Yuan and T. Li, 'Towards Sustainable In-Situ Server Systems in the Big Data Era', in 'Proc. - Int. Symp. Comput. Archit.', Vol. 13-17-June, Institute of Electrical and Electronics Engineers Inc., 345 E 47TH ST, NEW YORK, NY 10017 USA, 2015 LINK https://doi.org/10.1145/2749469.2750381
218. S. Howell, Y. Rezgui, J.-L. L. Hippolyte, B. Jayan and H. Li, *Renew. Sustain. ENERGY Rev.*, 2017, **77**, (January), 193 LINK https://doi.org/10.1016/j.rser.2017.03.107
219. K. C. Sinha, S. Labi and B. R. D. K. Agbelie, *Transp. A Transp. Sci.*, 2017, **13**, (7), 591 LINK https://doi.org/10.1080/23249935.2017.1308977
220. S. H. Chauhdary, A. Hassan, M. A. Alqarni, A. Alamri and A. K. Bashir, *Sustain. Cities Soc.*, 2019, **45**, (November), 1 LINK https://doi.org/10.1016/j.scs.2018.11.008
221. C. J. C. Jabbour, A. B. L. D. S. Jabbour, J. Sarkis and M. G. Filho, *Technol. Forecast. Soc. Change*, 2017, LINK https://doi.org/10.1016/j.techfore.2017.09.010
222. D. Kamrowska and H. Obracht, *Sustain.*, 2018, **10**, (10), LINK https://doi.org/10.3390/su10103668
223. M. Borràs, J. B. Van Breest, R. C. Mas and A. A. Jordà, 'The Use of ICT Tools to

Iincrease Energy Efficiency in European Districts: District of Future Project', in 'CESB 2016 - Cent. Eur. Towar. Sustain. Build. 2016 Innov. Sustain. Futur.', 2016

224. N. S. . Godbole and J. . Lamb, 'Using Data Science & Big Data Analytics to Make Healthcare Green', in '2015 12th Int. Conf. Expo Emerg. Technol. a Smarter World, CEWIT 2015', Institute of Electrical and Electronics Engineers Inc., 2015 LINK https://doi.org/10.1109/CEWIT.2015.7338161
225. A. Carrasquilla-Batista, A. Chacon-Rodriguez and M. Solorzano-Quintana, 'Using IoT Resources to Enhance the Accuracy of Overdrain Measurements in Greenhouse Horticulture', in '2016 IEEE 36th Cent. Am. Panama Conv. CONCAPAN 2016', 2017 LINK https://doi.org/10.1109/CONCAPAN.2016.7942345
226. B. Sung and S. Do Park, *Sustain.*, 2018, **10**, (2), LINK https://doi.org/10.3390/su10020448
227. S. Pincetl and J. P. Newell, *Geoforum*, 2017, **85**, 381 LINK https://doi.org/10.1016/j.geoforum.2017.03.002
228. A. R. De La Concepcion, R. Stefanelli and D. Trinchero, 'A Wireless Sensor Network Platform Optimized for Assisted Sustainable Agriculture', in 'Proc. 4th IEEE Glob. Humanit. Technol. Conf. GHTC 2014', 2014 LINK https://doi.org/10.1109/GHTC.2014.6970276
229. F. Shrouf, B. Gong, J. Ordieres-Meré and J. Ordieres-Mere, *J. Clean. Prod.*, 2017, **142**, (4), 2570 LINK https://doi.org/10.1016/j.jclepro.2016.11.019
230. B. Delinchant, F. Wurtz, S. Ploix, J.-L. J.-L. Schanen and Y. Marechal, *SMARTGREENS 2016 - Proc. 5th Int. Conf. Smart Cities Green ICT Syst.*, 2016, (Figure 1), 316
231. Ellen MacArthur Foundation, 'Towards a Circular Economy: Business Rationale for an Accelerated Transition', , 2015
232. Ellen MacArthur Foundation, 'Delivering the Circular Economy: A Toolkit for Policymakers', , 2015
233. M. Lieder and A. Rashid, *J. Clean. Prod.*, 2016, **115**, 36 LINK https://doi.org/10.1016/j.jclepro.2015.12.042
234. J. Kirchherr, D. Reike and M. Hekkert, *Resour. Conserv. Recycl.*, 2017, **127**, (September), 221 LINK https://doi.org/10.1016/j.resconrec.2017.09.005
235. N. M. P. Bocken, I. de Pauw, C. Bakker and B. van der Grinten, *J. Ind. Prod. Eng.*, 2016, **33**, (5), 308 LINK https://doi.org/10.1080/21681015.2016.1172124
236. F. Pomponi and A. Moncaster, *J. Clean. Prod.*, 2017, **143**, 710 LINK https://doi.org/10.1016/j.jclepro.2016.12.055
237. E. Iacovidou, J. Millward-Hopkins, J. Busch, P. Purnell, C. A. Velis, J. N. Hahladakis, O. Zwirner and A. Brown, *J. Clean. Prod.*, 2017, **168**, 1279 LINK

https://doi.org/10.1016/j.jclepro.2017.09.002

238. G. Heyes, M. Sharmina, J. M. F. Mendoza, A. Gallego-Schmid and A. Azapagic, *J. Clean. Prod.*, 2018, **177**, 621 LINK https://doi.org/10.1016/j.jclepro.2017.12.168
239. A. Mayer, W. Haas, D. Wiedenhofer, F. Krausmann, P. Nuss and G. A. Blengini, *J. Ind. Ecol.*, 2018, **00**, (0), 1 LINK https://doi.org/10.1111/jiec.12809
240. M. Howard, P. Hopkinson and J. Miemczyk, *Int. J. Prod. Res.*, 2018, **7543**, LINK https://doi.org/10.1080/00207543.2018.1524166
241. C. J. Chiappetta Jabbour, J. Sarkis, A. B. Lopes de Sousa Jabbour, D. W. Scott Renwick, S. K. Singh, O. Grebinevych, I. Kruglianskas and M. G. Filho, *J. Clean. Prod.*, 2019, **222**, 793 LINK https://doi.org/10.1016/j.jclepro.2019.03.038
242. R Core Team, 'R: A Language and Environment for Statistical Computing' Vienna, Austria, 2018 LINK https://www.r-project.org/
243. H. Wickham, 'Ggplot2: Elegant Graphics for Data Analysis', Springer-Verlag New York, 2016 LINK http://ggplot2.org
244. K. Makiyama, 'Githubinstall: A Helpful Way to Install R Packages Hosted on GitHub' 2018 LINK https://cran.r-project.org/package=githubinstall
245. B. Rudis and B. Embrey, 'Pluralize: Pluralize and Singularize Any (English) Word' 2016 LINK http://github.com/hrbrmstr/pluralize
246. K. Hornik, C. Buchta and A. Zeileis, *Comput. Stat.*, 2009, **24**, (2), 225 LINK https://doi.org/10.1007/s00180-008-0119-7
247. I. H. Witten and E. Frank, 'Data Mining: Practical Machine Learning Tools and Techniques', 2nd Ed., Morgan Kaufmann, San Francisco, 2005
248. M. Bouchet-Valat, 'SnowballC: Snowball Stemmers Based on the C Libstemmer UTF-8 Library' 2014 LINK https://cran.r-project.org/package=SnowballC
249. K. Benoit, D. Muhr and K. Watanabe, 'Stopwords: Multilingual Stopword Lists' 2017 LINK https://cran.r-project.org/package=stopwords
250. I. Feinerer, K. Hornik and D. Meyer, *J. Stat. Softw.*, 2008, **25**, (5), 1 LINK http://www.jstatsoft.org/v25/i05/
251. I. Feinerer and K. Hornik, 'Tm: Text Mining Package' 2018 LINK https://cran.r-project.org/package=tm
252. I. Fellows, 'Wordcloud: Word Clouds' 2014 LINK https://cran.r-project.org/package=wordcloud