



Sustainability and the European Waste Management Industry

Peter Jones* and Daphne Comfort

School of Business and Technology, University of Gloucestershire, UK

Abstract

Waste raises a range of environmental problems within Europe and sustainability has become an increasingly important challenge for the waste management industry. The aim of this paper is to offer an exploratory review of the approaches to sustainability within the European waste management industry. The paper begins with brief outlines of waste and the waste management industry in Europe and the growing interest in sustainability reporting. This is followed by a review of the sustainability reporting by some of the leading waste management companies operating within Europe and the paper concludes by offering some reflections on current approaches to sustainability within the industry. The findings reveal that the sustainability reports included details of a wide range of environmental, social and economic issues but more generally, the reports had a number of weaknesses that undermined their transparency and credibility. The authors also argue that the selected companies' definitions of, and commitments to, sustainability are principally driven as much by business imperatives as by any fundamental concern to maintain the viability and integrity of natural and social capital.

Keywords

Waste management industry, Corporate sustainability, Sustainability reporting, Circular economy, Economic growth, Europe

Introduction

The generation of waste raises a range of environmental issues within Europe and presents a number of challenges for the waste management industry. In addressing 'the challenge of waste' the European Commission [1], for example, highlighted 'the need for sustainable and coordinated standards of waste management in the European Union'. More recently, the European Commission [2] argued that 'proper waste management is a key element in ensuring resource efficiency and the sustainable growth of European economies'. In a review of solid waste management in 15 European countries, Pires, et al. [3] argued 'in the 21st century the sustainable management of municipal solid waste will become necessary at all phases of impact from planning, to design, to operation and to decommissioning'. Zero Waste Europe [4], a knowledge network and advocacy group, which looks to empower communities and change agents from around Europe to redesign their relationship with resources and to adapt their lifestyles and consumption patterns, claimed 'at national and local levels there are many municipalities and organisations promoting the Zero Waste strategy as a way to make Europe more sustainable'. The pressure group, Friends of the Earth Europe [5] stressed that 'European Union funds should be invested in integrated sustainable waste management'. A number of studies have been undertaken on approaches to various elements of waste management within Europe, e.g. Pires, et al. [3] and Gentil, et al. [6]. However, sustainability within the waste management industry has received scant attention in the academic literature with the study by Jeswani

and Azapagic [7] of the environmental sustainability of energy recovery from municipal solid waste in the UK being a notable exception.

However, it is important to recognise that the concept of sustainability is contested and 'means different things to different people' Aras and Crowther [8]. Firstly, there are definitions essentially based in and around ecological principles and secondly, there are definitions which look to embrace social and economic development as well as environmental goals, and which also look to embrace equity in meeting human needs. More critically, Hudson [9] argued that definitions range from 'pallid blue green to dark deep green'. The former, Hudson [9] suggested centre on 'technological fixes within current relations of production, essentially trading off economic against environmental objectives, with the market as the prime resource allocation mechanism' while for the latter 'prioritizing the preservation of nature is pre-eminent'. In a similar vein, a distinction is often made between 'weak' and 'strong' sustainability and Roper [10] suggested that 'weak sustainability prioritizes economic development, while strong

*Corresponding author: Peter Jones, School of Business and Technology, University of Gloucestershire, Cheltenham, UK

Accepted: June 04, 2019

Published online: June 06, 2019

Citation: Jones P, Comfort D (2019) Sustainability and the European Waste Management Industry. Adv Environ Stud 3(1):198-208

sustainability subordinates economies to the natural environment and society, acknowledging ecological limits to growth'.

At the same time, a number of critics see the growing business interest in sustainability as little more than a thinly veiled and cynical ploy, popularly described as 'green wash', designed to attract socially and environmentally conscious consumers while sweeping pressing environmental and social concerns under the carpet. So seen, corporate commitments to sustainability might be characterised by what Hamilton [11] described as 'shifting consciousness' towards 'what is best described as green consumerism'. This he sees as 'an approach that threatens to entrench the very attitudes and behaviours that are antithetical to sustainability' and argues that 'green consumerism has failed to induce significant inroads into the unsustainable nature of consumption and production'. Perhaps more radically Kahn [12] argued that 'green consumerism' is 'an opportunity for corporations to turn the very crisis that they generate through their accumulation of capital via the exploitation of nature into myriad streams of emergent profit and investment revenue'. With these thoughts in mind, the aim of this paper is to offer an exploratory and introductory review of the approaches to sustainability within the European waste management industry. The paper begins with brief outlines of the waste and the waste management industry in Europe and the growing interest in corporate sustainability and sustainability reporting. This is followed by a review of the sustainability reports and published by some of the leading waste management companies operating within Europe and the paper concludes by offering some reflections on current approaches to sustainability within the industry.

Waste and the Waste Management Industry in Europe

Waste is widely seen to be a growing issue within Europe. Put simply, Malinauskaite, et al. [13] suggested 'as European society has grown wealthier, it can afford to buy more products and therefore more waste is produced than ever before'. Further Malinauskaite, et al. [13] claimed 'consumption has also changed dramatically, as consumers have much more choice and products are designed to have shorter lifespans with more single-use and disposable products'. At the same time, there are some difficulties in estimating the amount of waste generated across the continent. These difficulties reflect variations in the way waste is defined and measured; different approaches to the collection of data on waste in the political jurisdictions; and the challenges involved in accurately capturing data across such a wide, and in some cases remote range, of geographical locations. In such locations and where waste disposal may go unrecorded and/or be undertaken clandestinely as part of the black economy.

The precise definition of what constitutes waste varies. The United Nations Environment Programme [14], for example, has suggested that 'the classification of what is or is not, waste is largely dependent on technological innovations achieved and applied', that 'the borderline between waste/nonwaste varies therefore by country, and even within a country' and that 'waste production can be expensive to measure at source, unless already done for other purposes, such

as billing; thus, consistent and comparable statistics can be difficult to obtain'. The United Nations Economic Commission for Europe [15] suggested that in Eastern Europe, for example, there were 'problems with data collection from enterprises and municipalities' not least in that 'data collection does not cover all economic sectors and estimates are needed for rural areas not served by the municipal waste collecting system', that 'in general, obligations for reporting are legally in place but not often applied in practice' and that, 'different methodologies and classifications used at national level make it difficult to compare the United Nations Economic Commission for Europe countries'.

The European Commission [16], defines waste as 'any substance or object which the holder discards or intends to discard or is required to discard' and all Member States are obliged to collect data on waste generation and treatment in accordance with Regulation (EC) No 2150/2002 of the European Parliament and Council. In 2014, the total waste generated by all economic activities and households across all 28 Member States was 2,053 million tonnes, the largest ever recorded since the European Union first collected such data. In 2014 across all the Member States construction accounted for 34.7% of the total waste generated, mining and quarrying for 28.2%, manufacturing for 10.2%, waste and water services for 9.1%, households for 8.3% with other sources, mainly services and energy, for the remaining 9.5% [2]. The picture outside the European Union's Member States is less clear. However, the European Commission [2] reported that Norway and Iceland, for example, generated 11.7 and 4.5 million tonnes of waste respectively in 2014, while the United Nations Economic Commission for Europe [15] reported that in 2008 the Russian Federation generated 3,877 million tonnes of waste.

Landfill, the deposit of waste onto or into land, was traditionally the most common and widespread method of waste disposal within Europe. However, the introduction of a number of European Union and national government directives have seen an increasing decline in this method of waste management. The European Union Waste Framework Directive, for example, introduced in 2008, set out five steps (the so called 'waste hierarchy') for dealing with waste, ranked according to environmental impact, as waste prevention, preparation for reuse, recycling, energy generation and with landfill as the last resort. The European Commission [2] reported that in 2014 2,230 million tonnes of waste, including waste imported into the European Union, were treated in the Member States. Some 47.4% was sent to landfill sites, 10.2% was backfilled, 36.2% was recycled, 4.7% was incinerated with energy recovery and the remaining 1.5% was just incinerated [European Commission 2]. The European Commission [2] also reported some significant variations in treatment methods across the Member States with Italy and Belgium, for example, having high recycling rates while Bulgaria, Romania, Greece, Finland and Sweden relied heavily on landfill.

The generation and management of waste has a number of environmental impacts. Some of the waste that is land filled may decompose and smell and more importantly, gen-

erate methane gas, which contributes to greenhouse emissions. Chemicals can leach out from landfill sites and contaminate surrounding soils and watercourses, thereby damaging ecosystems and endangering both plant and animal populations and posing potential health hazards to humans. Waste containing toxic materials can produce severe pollution problems that may remain in local ecosystems for many years. The growing volume of electrical and electronic waste, such as computers, televisions and microwaves, contain a range of hazardous substances including mercury, lead, arsenic and cadmium and can produce persistent environmental contamination. At the same time, badly managed landfill sites may be visually unattractive, prone to pest infestations and attract vermin. The incineration of waste also causes environmental problems and gases from the incineration process may cause air pollution and contribute to acid rain, while the ash from incinerators may contain heavy metals and other toxins.

While the collection sector of the waste management industry within Europe is fragmented, particularly in the commercial and industrial sector, the treatment, recycling and recovery sector is more concentrated. A number of the leading players operate across a wide geographical area and have a range of businesses in addition to waste management. Suez Environment, for example, is a French based multinational corporation and has operations in 8 European countries namely, Germany, France, Belgium and Luxembourg, Spain, Netherlands, Sweden and the UK. Veolia Environmental Services, is also a French multinational with operations in 48 countries and its activities include water distribution, energy supply and construction as well as waste management. FCC Environment's operations are in the UK and in Central and South-Eastern Europe and here the company has operations in Austria, Poland, Czech Republic, Slovakia, Hungary, Romania, Serbia and Bulgaria. The company manages 28 landfill sites, 12 alternative fuel treatment plants and a hazardous waste incineration plant, serves 5 million residents and 50,000 business clients and processes 4 million tonnes of waste per annum. Indaver, which is headquartered in Belgium, provides waste management services for large industries and public authorities and has facilities and operations in Belgium, Germany, France, Ireland, UK, Netherlands, Italy, Spain and Portugal. Renewi is a leading European waste management company with operations in Europe and North America. The company was formed in 2017 by the merger of Shanks Group and Ganswinkel Groep and has some 8,000 employees working across 250 locations in Netherlands, UK, Germany, Belgium, Hungary, Portugal, France, Luxembourg and Canada. Lassila & Tikanoja, headquartered in Helsinki, has waste management operations in Finland, Sweden and Russia and employs 8,500 people.

While large companies operating in a number of countries are the dominant force in the waste management industry, within Europe there are a wide range of companies serving smaller, but still significant, geographical markets. The Biffa Group, founded in 1912, operates exclusively within the UK. The company's operations now cover virtually all the UK, it provides collection, recycling, treatment, disposal and energy generation services, collects domestic waste from 2.4 million

households and has 75,000 business customers and 7,000 employees. More regionally, for example, Renova Group is owned by ten municipalities in western Sweden and takes responsibility for waste and recycling for these municipalities. In 2016 the company treated 1.14 million tonnes of waste and contributed to district heating production and electricity generation in the region. Lipor is a solid waste management company in the Porto region of Portugal which processes some 450,000 tonnes of waste generated by 1 million people each year.

Corporate Sustainability and Sustainability Reporting

The concept of sustainability is not new. Du Pisani [17], for example, demonstrated *'how the idea of sustainability evolved through the centuries as a counter to notions of progress'*. Du Pisani [17] concluded *'fears that present and future generations might not be able to maintain their living standards stimulated a mode of thinking that would inform discourses which prepared the way for the emergence and global adoption of sustainable development'*. The concept re-appeared in the environmental literature in the 1970's and since then the term sustainability has become increasingly seen as offering potential solutions to a wide range of challenges and problems from the global to the local scale, across seemingly almost all walks of life. Barr [18], for example, claimed that *'one of the most pressing and complex question of the early twentieth-first century' is 'how to promote the behavioural shifts necessary for creating the sustainable society'*. Diesendorf [19] argued that *'sustainability' can be seen as 'the goal or endpoint of a process called sustainable development'*. The most widely used definition of sustainable development initially proposed by the World Commission on Environment and Development [20] is *'development that meets the needs of the present without compromising the ability of future generations to meet their own needs'*.

As investors, consumers, governments, interest groups and the media have become more acutely aware of the environmental, social and economic impacts of business activities, so corporate sustainability initiatives have assumed ever increasing importance. KPMG [21] for example, suggested that *'the evidence that sustainability is becoming a core consideration for successful businesses around the world grows stronger every day'*. While there is broad agreement that corporate sustainability is concerned with environmental, social and economic issues, there is little consensus in defining the term and, as with sustainability, a number of meanings can be identified. There are definitions which seem to emphasise business continuity. Dyllick and Hockerts [22], for example, defined corporate sustainability as *'meeting the needs of a firm's direct and indirect shareholders..... without compromising its ability to meet the needs of future stakeholders as well'*. There are also definitions that look to include environmental and social goals and to formally incorporate these goals into corporate strategy. van Marrewijk and Werre [23] for example, argued that *'corporate sustainability refers to a company's activities - voluntary by definition - demonstrating the inclusion of social and environmental concerns'*. In some

ways Amini and Bienstock [24] combined both approaches and argued that corporate sustainability *'embraces the idea that an organization, in order to remain fundamentally sustainable in the long term, must consider all of the contexts in which it is embedded: economic, social and environmental'*.

More generally, corporate sustainability is also increasingly seen to be linked to the more recently developed concept of the creation of shared value. Porter and Kramer [25] defined this concept as *'policies and practices that enhance the competitiveness of a company, while simultaneously addressing the economic and social conditions in the communities in which it operates'* [25]. Essentially Porter and Kramer [25] suggested that the purpose of the corporation had to be re-defined as creating economic value in a way that also creates value for society by addressing its challenges and needs, and the concept has been adopted by a small, but growing, group of large companies. Nestle [26], for example, claimed that *'looking to the future, creating shared value remains a fundamental guiding principle of how we do business'* and that *'our positive impact on society focuses on enabling healthier and happier lives for individuals and families, on helping the development of thriving and resilient communities and, finally, on stewarding the planet's natural resources for future generations'*.

The growing interest in, and commitment to, corporate sustainability has seen the emergence of sustainability reporting across a wide range of companies and organisations. In essence, sustainability reporting is a general term used to describe how a company, or an organisation, publicly reports on its environmental, social and economic impacts and performance. For the Global Reporting Initiative [27] *'sustainability reporting is the practice of measuring, disclosing, and being accountable to internal and external stakeholders for organizational performance towards the goal of sustainable development'*. van Wensen, et al. [28] argued that *'sustainability reporting is the provision of environmental, social and governance information within documents such as annual reports and sustainability reports.'*

A number of private companies and voluntary organisations offer sustainability reporting services and frameworks but the United Nations Environment Programme [29], argued that the Global Reporting Initiative *'has become the leading global framework for sustainability reporting'*. Within the current Global Reporting Initiative (G4) guidelines materiality and external assurance are seen to be of central importance. Materiality is concerned with who is involved in identifying the environmental, social and economic issues that matter most to a company and its stakeholders and how this process is undertaken. External assurance is a procedure employed to provide confidence in both the accuracy and the reliability of the reporting process. External providers offer two levels of assurance namely *'reasonable'* (high but not absolute) and *'limited'* (moderate) and the higher the level of assurance the more rigorous the assurance process. More generally, the increasing focus on materiality and external assurance reflects calls for greater transparency within sustainability reporting.

Frame of Reference and Methodology

In an attempt to undertake an exploratory review of how the European waste management industry is approaching sustainability the authors selected a number of the leading companies operating within Europe namely, Veolia Environmental Services; Suez Environment; Remondis; Indaver; Renewi; FCC Environment; Lassila & Tikanoja; and Biffa Group for study. By way of a rationale for their approach, the authors recognised that these eight companies have waste management operations in some 20 countries spread across Northern, North Western, Southern, Central and Eastern Europe and as such offer a pan-European perspective on the approaches to sustainability within the European waste management industry. At the same time, being amongst the leading players within the industry the selected companies might be seen to reflect contemporary approaches to sustainability within the sector and to be keen to publicise their sustainability initiatives to a wide audience. However, the focus of the paper is on looking to ascertain and review the sustainability issues being addressed within the European waste management industry as a whole rather than on providing a comprehensive or comparative evaluation of the sustainability policies and achievements of the leading players within the industry. At the same time, the paper should be seen as an introductory study of the European waste management industry's approach to sustainability. As such, it provides not only a general review and a range of specific illustrations of this approach and a number of the wider sustainability issues and challenges within the industry, but also a platform for more detailed studies of sustainability within the European waste management industry.

Companies have employed a range of methods to report on their sustainability commitments and achievements but publication on corporate websites has become the most popular and the most accessible reporting mechanism [30]. This led the authors to conduct a digital Internet search for information, using the key phrase *'sustainability report'* and the name of each of the selected waste management companies. This search was undertaken in November 2017, employing Google as the search engine, and the reports for each of the selected companies obtained from this search process provided the empirical information for this paper. While some of the selected companies operate on an international scale, as noted earlier, and reported on a many of their achievements in a range of countries in their sustainability reports, the authors looked to use examples drawn from Europe for the empirical material in the paper. The authors recognise that the waste companies produce these reports and that in them they present their story of their approach to sustainability. Nevertheless, the authors believe that the reports present a valuable, wide ranging and publicly accessible source of information on approaches to sustainability within the industry. At the same time, the selected companies' approaches to sustainability reported in the Findings section of the paper are subjected to review and reflection in the Discussion section of the paper and this provides an element of balance within the paper.

The authors took the decision to tease out the key themes and narratives by a close inspection of the sustainability re-

ports on the selected companies' corporate web sites. The specific examples and selected quotations drawn from the leading waste management companies' corporate websites cited below are used for illustrative rather than comparative purposes. The paper is based on information that is in the public domain and the authors took the considered view that they did not need to contact the selected companies to obtain formal permission prior to conducting their research. When outlining the issues of reliability and validity in relation to information drawn from the Internet, Saunders, et al. [31] emphasised the importance of the authority and reputation of the source and the citation of a specific contact individual who can be approached for additional information. In reviewing the sustainability reports the authors felt that the two conditions were met.

Findings

The findings revealed marked variations in the extent and style of the corporate sustainability reporting process amongst the selected European waste management companies. Three of the selected companies namely, Veolia Environmental Services, Suez Environment and Lissila & Tikanoja posted an integrated annual and sustainability report, Indaver, Renewi and Biffa posted dedicated sustainability or corporate social responsibility reports, while both of which contain some of the features of a sustainability report and which will be treated as such for the Remondis posted a website dedicated to sustainability and FCC Environment posted an Environment Brochure, purposes of this paper. The reports varied considerably in length and in the depth and detail of their coverage. Each of the selected waste management companies reported on their sustainability strategies and agendas and on their achievements against those agendas in their own individual ways.

There was little or no uniformity in the character, layout or length of the sustainability reports and while some of the selected companies provided detailed structured narratives and supporting data, others offered a lighter and less detailed commentary. Some of the selected companies reinforced their narratives with selected data and/or graphical representations of such data. The selected companies illustrated the narrative in their sustainability reports with cameo 'case studies' and with short quotations from senior company executives as well as with diagrams and photographic images. Three of the selected companies, namely Suez Environment, Indaver and Lassila & Tikanoja claimed that their reports had been prepared with reference to the Global Reporting Initiative (G4) framework. Only Suez Environmental provided detailed time series data on the standard environmental, social and economic indicators specified in this framework, as well as on more general range of environmental and social performance indicators, though some of the other selected companies provided limited time series data on some environmental and social measures of their commitment to sustainability.

The majority of the selected waste management companies emphasised their corporate concern for, and commitment to, sustainability. Suez Environment [32], for example, reported *'our ambition is to become the leader in sustainable*

resource management', FCC Environment [33] claimed *'all our solutions are based on a sustainable waste management concept'*. Indaver [34] stressed *'our mission is leading the field in sustainable waste management'* and Renewi [35] claimed *'we endeavour to protect the world's resources and preserve the planet for future generations through our sustainable activities'*. In his forward to the Biffa Group's corporate social responsibility report Ian Wakelin, the company's Chief Executive, emphasised that *'our position in the waste and resources chain means that we are integral to the supply of sustainable solutions for our customers and therefore corporate social responsibility is at the heart of everything we do'* [36]. Such strategic commitments were illustrated across a range of environmental, social and economic agendas.

However, of the six selected companies that produced formal sustainability reports, just three, namely, Suez Environmental, Renewi and Indaver provided information on the materiality analysis undertaken to reveal and prioritise environmental, social and economic issues according to their potential impact on the company's activities and their importance to stakeholders. In the materiality assessment conducted by Suez Environmental, for example, 51 issues were selected according to four sets of factors. The 51 issues included adapting to climate change, greenhouse gas emissions, biodiversity and ecosystemic services, renewable energy from waste and wastewater, diversity and inclusion, skills and employee development and relationships with social entrepreneurs. The four sets of factors which informed the selection process were the coverage they had received in the previous six months; their importance to a range of internal and external stakeholders; their negative or positive impact on the company's financial results over the previous five years; and the degree of command of the operational processes implemented by the company to address the issues.

Arguably less comprehensively under the banner *'anticipating expectations'* Indaver [34] reported establishing a *'working party consisting of staff from the various regions and departments determines the content and scope of the report, ensuring that it is balanced and representative of the entire organisation'* which *'ensures that the sustainability is written with our various stakeholders in mind'*. Of the six selected companies who published formal sustainability reports, only Suez Environment reported commissioning reasonable and limited external assurance, as defined earlier, of a wide range of environmental, social and community indicators. Here, for example, the external auditors provided reasonable assurance of a number indicators including, both direct and indirect greenhouse gas emissions, energy consumption, the workforce by gender, safety in the workplace and the percentage of the workforce involved in training initiatives. Limited assurance also covered a range of indicators including the treatment of hazardous waste, the demographic profile of employees, and the categories of training provided to employees. By way of contrast while Renewi [35] reported that the company exercised good governance and sought external verification of its approach and performance in *'all three of our key focus areas of the environment, people and society'* it provided no details of formal external assurance.

The selected waste management companies addressed a number of interlinked environmental issues, including climate change and carbon dioxide emissions, energy efficiency, the environmental impact of waste management operations, water management, and the promotion of biodiversity and ecosystem services. More generally, Lassila & Tikanoja [37] stressed *'our mission is to make our environment a better place to live and function'*. The issues of climate change and energy efficiency were addressed, albeit in different measure, in the majority of the selected companies' sustainability reports. Under the banner headline *'Ongoing Mobilization for Climate Change'*, Suez Environmental [32] for example, reported delivering *'solutions that help to fight climate change'* which the company described as *'the main challenge facing mankind at the start of the 21st century'* and *'on including a carbon price in its investment decisions, to encourage investment in clean energy and to promote an increasingly carbon-free economic and environmental model'*. Suez Environment [32] also identified biodiversity loss, the impact of extreme weather on infrastructure and price fluctuations of raw material and energy as the major risks associated with climate change.

Veolia Environmental Services outlined its focus on three priorities designed to help implement the Paris Climate Agreement namely promoting the circular economy more widely to avoid fossil fuel use, capturing and recovering methane and lobbying for the introduction of a robust and stable carbon price to enable low carbon solutions to be rolled out. On the issue of carbon pricing, for example, the company reported that it had set an internal price for carbon which was being used as one of the assessment criteria for all projects and as one element taken into consideration when choosing between different investment opportunities. In addressing *'Emissions and Environmental Impact'* Indaver [34] provided a simple *'mass balance'* analysis for its rotary kilns in Antwerp, Biesbesheim, Hamburg, Doel and Meath. This analysis revealed waste inputs as well as details of the inputs of energy, water and cleaning and purification additives and outputs of clean emissions to the atmosphere, energy generation and residual products.

Water management is also seen as an important issue by some of the selected companies. Suez Environment [32], for example, reported on joining the Business Alliance for Water and Climate Change, which looks to encourage businesses to measure and reduce their impact on water and argued that *'the resilience of water resources is also at the heart of the fight against climate change'*. At a more local level Biffa Group reported undertaking a number of site surveys in an attempt to assure the efficiency of its water usage. These surveys revealed some 11,000 litres of leakage and Biffa Group reported that its remedial work on these problems would reduce the company's water usage and environmental impact. Indaver [34] reported on that the company *'uses water frugally. It invests in new technologies and methods in order to further reduce water consumption and its impact on the environment'*.

Some of the selected companies reported on looking to minimise the environmental impact of their waste manage-

ment operations. Under the banner *'Turning Contaminated Sites into Valuable Land'*, Remondis [38], for example, reported that the company provided *'a full package of services, we take on all the tasks required for such remediation projects - from the planning and analysis stages, to the demolition and excavation work, all the way through to the logistics, recycling and documentation'* and that *'thanks to our remediation services, we are able to breathe new life into contaminated sites so they can be used again'*. Indaver reported on looking to achieve efficiencies in the water used at its facilities and sites and on monitoring its operations closely in order to minimise their impact on water courses and water bodies. FCC Environment [33] outlined its work in providing *'remediation of environmental burdens such as old industrial, municipal and hazardous waste landfills, contaminated soils, water and groundwater'* and the *'reclamation of thixotropic sludge lagoons'*. More generally as part of its *'contribution to the common good'* Suez Environment [32] listed its commitment *'to promote biodiversity and ecosystem services'*. As a specific illustration of its contribution to enhancing biodiversity, Suez Environment [32] provided a mini case study of its wastewater recycling plant that supplies an electricity power station at Lake Macquarie, in Australia, which had reduced *'the discharge of treated wastewater into the natural environment near areas of lakes, beaches bird reserves and marine life'*.

In reviewing the social dimensions of sustainability being addressed by the selected companies a number of themes can be identified including, the importance of employees, diversity, health and safety, and community relations. In focusing on its employees Remondis [38], for example, reported *'our focus is on creating flat hierarchies, high levels of responsibility and great opportunities for our employees to carve out an attractive career for themselves, as well as on offering our staff ongoing further training courses and the opportunity to take part in our international management trainee programmes'*. Remondis [38] also reported *'we actively involve institutions in our procurement process that have a social or non-profitable set-up and that promote inclusion. As is the case in our company, such institutions are following the guiding principle that each and every individual should be able to find their place in society'*. In emphasising the importance attached to health and safety, Remondis [38] reported setting up a specialist Health & Safety Committee, *'which is responsible for developing internal safety guidelines and for regularly visiting the group's individual locations to check they are adhering to these'* and argued that *'these measures have clearly had a positive impact - as can be seen by our accident statistics: between 2010 and 2014, the number of accidents which resulted in employees being off work for three or more days fell by more than 14%'*.

In addressing its commitment to *'society'*, Renewi [35], argued *'our activities help society towards a more sustainable future, taking the views of our host communities into account, minimising the impact we have on them and giving something back - through what we do - is important to us'*. Renewi recognised that *'waste management operations, even the most sustainable, are often not popular in the neighbourhoods in which they operate'* and reported on opening

their sites and facilities, as part of a nationwide scheme in Belgium, to help people learn more about the companies operating within their communities. Renewi also reported on its participation in an anti-litter campaign which challenged local school children to suggest new ways to clean up rubbish and to encourage children to think about ways of handling waste in a sustainable way and to make them ‘ambassadors’ for the circular economy.’ Biffa Group reported donating £100, 000 to charity and on its work with charitable organisations and communities in various parts of the UK. This work included continuing support for a children’s hospice on the Wirral, running a schools art competition in Maidstone and organising a Christmas children’s toy collection scheme in Barrow.

Economic issues generally received limited explicit coverage in the sustainability reports posted by the selected waste management companies but included employment creation, supplier relationships, local sourcing and creating value for stakeholders. Suez Environment [32], for example, provided a cartographic illustration of its ‘*socio economic footprint in Europe*’, which included details of the total number of jobs supported by the company’s activities in nine European countries. In the UK, for example, the company had some 5, 500 employees and claimed that it supported a further 4,000 jobs in its supply chain. Remondis [38] reported ‘*very strong ties to the regions we operate in and are able to support their local economy*’ and that ‘*local suppliers account for around 98% of the expenses incurred by our key business locations*’. In a similar vein under the headline ‘*Economic Profitability That Benefits All*’ Suez Environment [32] stressed its commitment ‘*to further strengthen its commitment to local development and to regions in which it operates*’. Suez Environment further reported on its ‘*purchasing and subcontracting policy that favours the local economic fabric, particularly small and medium sized businesses, partnerships with organisations working in the field of social and responsible economy and the increased use of sources in the adapted and protected labour sectors*’.

The selected waste management companies’ general and specific commitments to sustainability were generally informed and underpinned by a number of intimately inter-linked themes namely, technological innovation, the creation of shared value, the circular business model and a commitment to continuing growth. The majority of the selected waste management companies stressed the importance of innovation and new technologies in improving efficiency across the sustainability spectrum. Suez Environment [32], for example, argued that ‘*new solutions for resource protection or disruptive economic models often originate in start-ups or positive-impact enterprises*’ and reported that it was working with a number of such small companies to ‘*build an open innovation system*’, for example, to recover organic waste and to prevent exposure to micro pollutants. At the same time Suez Environment [32] suggested that ‘*digital technology allows for dematerialized procedures, the structuring of short circuits and the smart management of facilities*. Indaver [34] claimed ‘*we foster new technology and/or business models in order to stay aligned with changing customer requirements and increasingly stringent EU targets. We are interested in*

opportunities that align with our focus on developing the circular economy, which are feasible from a technological and economic point of view, and which take into account expected energy and material price developments’. More specifically, Suez Environment [32] reported on accelerating ‘*the deployment of smart solutions*’ including the development of its ‘*Advanced Urban Drainage digital solution*’ which ‘*responds to the growing need for cities to combat the risks of flooding and the pollution of natural habitats*’.

A number of the selected companies highlighted their commitment to creating value and here the focus was often on shared value. Suez Environment [32] for example, provided a graphic illustration of its ‘*shared value*’, which embraced human capital, environmental capital, financial capital, intellectual capital and social capital. The shared value of environmental capital, for example, was illustrated by 9.5 million tonnes of carbon dioxide emissions being avoided and 92% of the company’s wastewater being depolluted, that of financial capital by the 602 million Euros distributed to shareholders and that of intellectual capital by 1.4 million hours of employee training. Indaver [34] emphasised ‘*value is an integral part of our vision for sustainable production and consumption practices within a circular economy*’.

A number of the selected companies reported on their commitment to the concept of the circular economy and to a circular business model. Indaver [34], for example, emphasised ‘*we have a clear understanding of our role in the circular economy, and have incorporated this into our organisational vision*’ and ‘*the most significant external policy underpinning our activities is the European Union’s action plan for the circular economy*’. More specifically, Indaver stressed its decision to ‘*opt for recovery of high-quality raw materials and energy and keeping the materials loop clean*’ and reported that in 2017 the company had ‘*managed 4-8 million tonnes of waste, of which 3.6 million tonnes were treated in our own facilities*’. In outlining its strategy to be ‘*the world leader in sustainable resource management*’, Suez Environment [32] reported that the company was ‘*fully committed to advancing the cause of the circular economy*’ and suggested that by transforming its activities and ‘*integrating them into a circular economic model*’ the company is ‘*driving optimisation of operational performance*’. Renewi [35] claimed to be ‘*at the heart of the circular economy*’. Biffa Group [36] claimed that ‘*the journey to a more circular economy has been embraced by the waste management and resource sector*’, argued that the company had ‘*been instrumental in shaping circular economy thinking*’ and reported that in its long-standing relationship with Wyevale Garden Centres, the company was ‘*changing behaviours and embedding circular economy principles into daily operations*’. Here, Biffa Group [36] reported that ‘*recycling across the centres has reached 70%*’ and that a scheme had been set up to collect unwanted items from employees and customers and then to sell them in Marie Curie charity shops.

With an eye to the future, the sustainability reports posted by a number of the selected European waste management companies were couched within the idiom of continuing growth and business expansion. Renewi [35], for example, argued ‘*we have the scale, capacity and resources to drive*

growth'. Veolia Environmental Services [39], emphasised that its strategy 'is based on the dual dynamic of growth and efficiency' and reported that 'our focus on growth aims to amplify our organic expansion' and that 'our healthy reservoir of projects in the pipeline - along with contracts signed in 2016 but not yet fully reflected in our results - provide us with solid hope for year-on-year revenue growth'. Indaver [34] reported 'we have outstanding growth prospects in those services that are based on the drive towards the circular economy, and the accompanying goals of a cleaner and safer environment, high-quality recovery, and continued competitiveness for our customers. In order to respond to the challenge of transitioning to a circular economy, we have developed a growth model focussing on three priority areas: improving process efficiency; focusing on organic growth; fostering breakthrough innovation'.

In summary, the findings reveal that all eight of the selected European waste management companies reported on their approach to sustainability, though there were marked variation in the nature of the reporting process. The majority of the companies emphasised their corporate commitment to sustainability and all reported on a number of environmental, social, and to a lesser extent, economic programmes which contributed to the sustainable development of their operations. The environmental programmes included action on carbon dioxide emissions, climate change, energy efficiency, water management and environmental impacts. Social programmes included diversity and health and safety in the workplace and community relations, while employment creation and creating value for shareholders were cited as important economic issues within corporate sustainability programmes. A number of more general and interlinked themes, including the creation of shared value, the importance of technological innovation and a commitment to the circular economy, also informed a number of the selected companies' sustainability reports. Within the overall sustainability reporting process only a minority of the selected companies publicly addressed the issues of materiality and external assurance.

Discussion

A number of sets of issues merit discussion and reflection. While the selected European waste management companies emphasised their commitment to sustainability, the terms sustainable development, sustainability and sustainable growth are rarely formally or explicitly defined within their sustainability reports. That said these reports include implicit definitions of sustainability, which consistently emphasise business continuity rather than the preservation and enhancement of natural and social capital. Such definitions are primarily built around business efficiency and cost savings and are driven largely by business imperatives. Thus, while many of the environmental agendas addressed by the selected companies are designed to reduce carbon dioxide emissions and to increase energy efficiency, for example, they also serve to reduce operating costs. In a similar vein, the selected companies' commitments to their employees, focusing for example, upon empowering employees and health and safety, help to promote stability, security, loyalty and efficiency amongst the workforce.

Although the selected European waste management companies addressed a range of environmental, social and economic agendas in their sustainability reports there are issues about the selection of these agendas and about the independent assurance of the data provided to illustrate achievements against these agendas. With the three exceptions noted earlier, there was no reference as to how material issues were identified by the majority of the selected companies or to the role of a range of external stakeholders in the identification process. As such, the sustainability reports posted by the majority of the selected waste management companies might be seen to represent the executive management's approach to sustainability rather than the potentially wider sustainability agendas and concerns of the company's stakeholders. At the same time, the approach to the construction of materiality matrices employed by some of the leading companies within the waste management industry might be seen to suggest the corporate privileging of sustainability goals rather than environmental, social and economic concerns. McElroy [40], for example, claimed that this approach 'essentially cuts out consideration of what are arguably the most material issues' namely 'the broad social, economic and environmental impacts of an organisation regardless of how they relate to a particular business plan or strategy'.

The general lack of independent external assurance of the data in the sustainability reports posted by the majority of the selected European waste management companies can also be seen to be problematic. This can be seen to reduce the credibility, integrity and reliability of the sustainability reporting process undertaken by the selected companies. That said the selected companies are large, complex and dynamic organisations and capturing and storing comprehensive information and data in a variety of geographical locations and then providing access to allow external assurance is a challenging and a potentially costly venture. Thus, while data on a company's carbon emissions may be systematically collected, collated and audited as part of the company's environmental commitments, information on their impact on local communities and levels of staff satisfaction may be more difficult to measure, collate, interpret and assure. Currently, the majority of the selected European waste management companies choose not to publicly pursue such an exercise.

The majority of the selected European waste management companies certainly see continuing innovation and technological development as vitally important in achieving more efficient resource use across the sustainability spectrum. More generally Clark and Dickson [41] suggested that 'the need for sustainable development initiatives to mobilize appropriate science and technology has long been recognized' and advances in technology are often seen to provide the best way of promoting greater efficiency. However, while Schor [42] recognised that 'advocates of technological solutions argue that more intelligent design and technological innovation can dramatically reduce or even stop the depletion of ecological resources', he argued that such approaches 'fail to address increases in the scale of production and consumption, sometimes even arguing that such increases are not unsustainable if enough natural-capital-saving technical change occurs'.

Value creation has traditionally been seen as one of the major objectives of businesses, though in posing the question *'for whom is value created'* Haksever, et al. [43] drew attention to whether companies must create value for its shareholders or more generally for all stakeholders. In addressing value creation, a number of the selected companies detailed benefits to both shareholders and stakeholders and such would seem to reflect the concept of shared value. That said Crane, et al. [44] identified a number of weaknesses and shortcomings in the creation of shared value model. More specifically Crane, et al. [44] argued that the model *'ignores the tensions between social and economic goals'*, that it is *'naïve about the challenges of business compliance'* and that it is *'based on a shallow conception of the corporation's role in society'*. In examining the first of these concerns, for example, Crane, et al. [44] suggested that *'many corporate decisions related to social and environmental problems, however creative the decision maker may be, do not present themselves as potential win-wins, but rather manifest themselves in terms of dilemmas'*. As such Crane, et al. [44] suggested that such dilemmas are effectively *'continuous struggles between corporations and their stakeholders over limited resources and recognition'*.

In theory, the ideas underpinning the concept of the circular economy might seem straightforward, but in practice, a number of operational challenges can be identified. Ritzen and Sandstrom [45] for example, identified a number of attitudinal, financial, structural, and technological barriers to a transition to a more circular economy. A shift towards a circular model was also perceived to require far reaching changes within companies and such changes take both time and investment and where corporate financial systems are focused on rapid returns on investment and cost savings this currently does not encourage long term strategic change. There are also challenges in developing indicators or measures that might help to monitor how a product or a company is progressing towards the circular economy and at the same time corporate finance departments are still developing and refining tools to measure the financial costs and benefits of pursuing circular business models. It is also important to recognise that the transition to a circular economy will both drive and demand major changes in consumer behaviour and consumption patterns. Such a transition may, for example, require dramatic changes in way in which consumers approach consumption and it seems likely to challenge the social value, which consumers ascribe to many products and services.

While the circular economy has a strong environmental focus, less attention has been paid to the social dimension. Murray, et al. [46], for example, argued that the circular economy *'is virtually silent on the social dimension, concentrating on the redesign of manufacturing and service systems to benefit the biosphere'*. A number of issues may be important here. While the transition to a circular economy will bring socio-economic benefits, for example in terms of the creation of new employment opportunities associated with the establishment of new waste management and recycling facilities, issues may arise in terms of the quality of such opportunities, the reward levels associated with them and the geographical

distribution of such benefits at regional, national and international levels. More generally, the impact of an increasingly important circular economy on social and intergenerational equity, seen to be fundamental to sustainable development, and to the United Nation's Sustainable Development Goals launched in 2015, may prove a complex and testing set of issues. Nevertheless, Wegmann [47] claimed *'the world's leading multinational companies in the waste management sector are very enthusiastic about the circular economy'* because these companies *'can profit twice from the same material for disposing of it and for selling it as a resource to producers'*.

The sustainability reports posted by the selected European waste management companies operating are generally couched within the idiom of continuing growth and there are debates about whether continuing economic growth is compatible with sustainability. On the one hand, the dominant corporate argument is that continuing economic growth will inevitably be accompanied by the more efficient use of resources. This trend, which is seen as either relative or absolute decoupling (relative decoupling refers to using fewer resources per unit of economic growth while absolute decoupling refers to a total reduction in the use of resources), underpins many conventional definitions of sustainability and the vast majority of current corporate sustainability strategies and programmes. Veolia Environmental Services [39], for example, recognised that *'natural resources are becoming increasingly scarce while the planet's needs are growing'* but argued that the company *'designs and implements solutions aimed at improving access to resources while at the same time protecting and renewing those same resources'*. More explicitly Suez Environment [32] argued that *'the desire to separate growth from the consumption of natural resources is growing'* and that *'green and inclusive growth is possible'*.

On the other hand, some critics have suggested that continuing economic growth, dependent as it is, on the seemingly ever-increasing depletion of the earth's natural resources is fundamentally incompatible with sustainability. Daly [48], for example, suggested that *'there is an obvious physical conflict between the growth of the economy and the preservation of the physical environment'* while Higgins [49] argued *'the economic growth we know today is diametrically opposed to the sustainability of our planet'*. Decoupling is seen by some critics as an elusive goal and Conrad and Cassar [50] suggested that *'a substantial body of research has cast doubts on whether countries can truly grow their way out of environmental problems. Arguably more radically Jackson [51] concluded a discussion of what he described as 'the myth of decoupling' by arguing that 'it is entirely fanciful to suppose that deep emission and resource cuts can be achieved without confronting the structure of market economies'*. In a similar radical vein, Valenzuela and Bohm [52] argued that while *'the concept of sustainability was originally brought to light to stand against the growth doctrine of capitalism and the overconsumption of natural resources'*, four decades later *'the term sustainability has been captured by politic-economic elites claiming that rapid economic growth can be achieved in a way that manages to remain responsible to environment*

and society'. Equally critically, Castro [53] has questioned the very possibility of sustainable development under capitalism and argued that economic growth relies upon the continuing and inevitable exploitation of both natural and social capital.

Conclusions

The selected European waste management companies publicly reported on their commitments to sustainability and on their achievements in meeting such commitments. A number argued that by integrating sustainability into their businesses, they are creating sustainable value, are better placed to provide long term growth and financial security for all stakeholders and to enhance their market position and reputation. However, the authors argue that the selected companies' definitions of, and commitments to, sustainability can be interpreted as being driven as much by business imperatives as by any fundamental commitments to sustainability. Thus, the accent currently appears to be on making efficiency gains across a wide range of economic, social and environmental issues rather than on maintaining the viability and integrity of natural ecosystems and on reducing demands on finite natural resources. As such the selected waste management companies are, at best, pursuing a 'weak' rather than a 'strong' model of sustainability. More critically, the authors suggest that the selected companies' commitments to sustainability were couched within existing business models centred on continuing growth and that current policies might be viewed as less than wholehearted commitments to sustainability. This echoes Roper's [10] belief that weak sustainability represents '*a compromise that essentially requires very little change from dominant economic driven practices but effectively works to defuse opposition, increase legitimacy and allow business as usual*'.

At the same time, the nature of the reporting process adopted by the majority of the selected waste management companies might be seen to leave something to be desired. Not least in the seeming reluctance to comply with Global Reporting Initiative guidelines, to address the issue of materiality, to commission independent external assurance and in the decision to use selective cameo case studies, rather than to provide comprehensive environmental, social and economic performance indicators, to illustrate sustainability achievements. In the light of the findings that the selected waste management companies are pursuing a weak model of sustainability and that the sustainability reporting process itself is seen to be flawed, then the commitments to sustainability expressed by the selected companies must be called into question. As such, the sustainability reports published by the selected European waste management companies might be seen to be part of wider marketing and public relations strategies designed to promote the leading players within the industry and further their commercial interests.

Looking to the future, and in the face of growing media, investor, customer, pressure group and government scrutiny, the selected European waste management companies may seek to further develop, and adopt, a more rigorous and transparent approach to their sustainability reporting. Here the leading players in the European waste management industry

may want to address how they can continue to reflect on corporate approaches to sustainability, on the development of such approaches over time and on how to bring greater value and transparency to the reporting process. At the same time, future academic research agendas might usefully build on the current paper by focusing on a number of avenues of enquiry. These might include, for example, detailed investigations of the ways the major players within the European waste management industry are engaging with stakeholders to identify material issues, into how the sustainability of different waste treatment methods and waste is monitored and reported and into whether greater transparency in the sustainability reporting process is reflected in corporate investment and profitability.

References

1. European Commission (2010) Being wise with waste: The European Union's approach to waste management.
2. European Commission (2017) Waste Statistics.
3. Pires A, Martinho G, Chang N-B (2011) Solid waste management in European countries: A review of systems analysis techniques. *Journal of Environmental Management* 92: 1033-1050.
4. Zero Waste Europe (2017) Empowering our communities to re-design.
5. Friends of the Earth Europe (2017) Cohesion policy for sustainable resource use and waste management.
6. Gentil E, Clavreul J, Christensen TH (2009) Global warming factor of solid waste management in Europe. *Waste Management and Research* 27: 850-860.
7. Jeswani HK, Azapagic A (2016) Assessing the environmental sustainability of energy recovery from solid municipal waste in the UK. *Waste Management* 50: 346-363.
8. Aras G, Crowther D (2008) Governance and sustainability: An investigation into the relationship between corporate governance and corporate sustainability. *Management Decision* 46: 433-448.
9. Hudson R (2005) Towards sustainable economic practices, flows and spaces: Or is the necessary impossible and the impossible necessary?. *Sustainable Development* 239-252.
10. Roper J (2012) Environmental risk, sustainability discourses and public relations. *Public Relations Inquiry* 1: 69-87.
11. Hamilton C (2009) Consumerism, self-creation and prospects for a new ecological consciousness. *Journal of Cleaner Production* 18: 571-575.
12. Kahn R (2010) Producing crisis: Green consumerism as an ecopedagogical issue. In: Sandlin JA, McLaren, *Critical Pedagogies of Consumption*. P Routledge, New York, 47-57.
13. Malinauskaitė J, Jouhara H, Czajczynska D, et al. (2017) Municipal solid waste management and waste-to-energy in the context of a circular economy and energy recycling in Europe. *Energy* 141: 2013-2044.
14. United Nations Environment Programme (2008) Waste Generation.
15. United Nations Economic Commission for Europe (2017) The Environmental Impact of Waste Generation and Waste Management.
16. European Commission (2012) Guidance on the interpretation of key provisions of Directive 2008/98/EC on waste.

17. Du Pisani JA (2006) Sustainable development - historical roots of the concept. *Environmental Sciences* 3: 83-96.
18. Barr S (2008) *Environment and Society. Sustainability, Policy and the Citizen*, Ashgate, Aldershot, England.
19. Diesendorf M (2000) Sustainability and Sustainable Development. In: D Dunphy, J Beneveniste, A Griffiths, et al., *Sustainability: The corporate challenge of the 21st century*, 19-27. Allen and Unwin, Sydney.
20. World Commission on Environment and Development (1987) *Our common future*.
21. KPMG (2012) *Corporate Sustainability: A Progress Report*.
22. Dyllick T, Hockerts K (2002) Beyond the business case for corporate sustainability. *Business Strategy and the Environment* 11: 130-141.
23. van Marrewick M, Wempe M (2002) Multiple Levels of Corporate Sustainability.
24. Amini M, Bienstock CC (2014) Corporate sustainability: An integrative definition and framework to evaluate corporate practice and guide academic research. *Journal of Cleaner Production* 76: 12-19.
25. Porter ME, Kramer MR (2011) Strategy and society: The link between competitive advantage and corporate social responsibility. *Harvard Business Review* 87: 78-92.
26. Nestle (2017) *Building on creating shared value*.
27. Global Reporting Initiative (2011) *Sustainability reporting guidelines*.
28. Van Wensen K, Broer W, Klein J, et al. (2011) The State of play in sustainability reporting in the European Union.
29. United Nations Environment Programme (2013) *Frequently asked questions on corporate sustainability reporting*.
30. Morhardt JE (2009) Corporate social responsibility and sustainability reporting on the internet. *Business Strategy and the Environment* 19: 436-452.
31. Saunders M, Lewis P, Thornhill A (2009) *Research methods for business students*. Prentice-Hall, Harlow.
32. Suez Environment (2017) *Sustainability report*.
33. FCC Environment (2017) *Corporate social responsibility report*.
34. Indaver (2017) *Sustainability rePort*.
35. Renewi (2017) *Corporate social responsibility report*.
36. Biffa Group (2016) *Corporate social responsibility report*.
37. Lassila, Tikanoja (2017) *Annual report and corporate governance statement*.
38. Remondis (2017) *Sustainability*.
39. Veolia Environmental Services (2017) *Annual and sustainability Report*.
40. McElroy M (2011) Are materiality matrices really material?.
41. Clark WC, Dickson NM (2003) Sustainability science: The emerging research program.
42. Schor JB (2005) Prices and quantities: Unsustainable consumption and the global economy. *Ecological Economics* 15: 309-320.
43. Haksever C, Chagant R, Cook RG (2004) A Model of value creation; strategic view. *Journal of Business Ethics* 49: 291-305.
44. Crane A, Palazzo G, Spence LJ, et al. (2014) Contesting the value of creating shared value. *California Management Review* 56: 130-154.
45. Ritzen S, Sandstrom GO (2017) Barriers to a circular economy - integration of perspectives and domains. *Procedia CIRP* 64: 7-12.
46. Murray A, Skene K, Haynes K (2015) The Circular economy: An interdisciplinary explanation of the concept in a global context. *Journal of Business Ethics* 140: 369-380.
47. Wegmann V (2017) *Waste management in Europe: Good jobs in the circular economy*.
48. Daly H (2017) A new economics for our full world. In: Victor PA, Dolter V, *Handbook on Growth and Sustainability*. Edward Elgar, Cheltenham, 85-106.
49. Higgins KL (2013) Economic growth and sustainability - are they mutually exclusive.
50. Conrad E, Cassar LF (2014) Decoupling economic growth and environmental degradation: Reviewing progress to date in the small island state of Malta.
51. Jackson T (2009) *Prosperity without growth?*.
52. Valenzuela F, Bohm S (2017) Against wasted politics: A critique of the circular economy. *Ephemera: Theory and Politics in Organization* 17: 23-60.
53. Castro C (2004) Sustainable development: Mainstream and critical perspectives. *Organization and Environment* 17: 195-225.

DOI: 10.36959/742/217