

INVESTIGATING THE EXTENT TO WHICH WASTE MANAGEMENT LEGISLATION AFFECTS WASTE MANAGEMENT PRACTICES WITHIN THE UK CONSTRUCTION INDUSTRY

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Studies on construction, demolition and excavation (CD&E) waste management (WM) suggest that among many success factors for ensuring sustainable management of waste, government legislation is the most critical. In the UK, there has been different legislation targeting the management of waste of which CD&E waste is a priority stream. To determine the criticality of waste legislation in the management of CD&E waste, this research investigated the drivers that dictate the WM strategies of construction firms. The study was conducted through a multiple case study approach using four construction firms who received awards for their environmental management and sustainability practices on their construction sites in 2013. Data was collected through interviews with the sustainability and environmental managers of the companies who have the overall responsibility for WM strategy in their firms and review of the environmental and waste policy documents of these firms. The results suggest that, although government legislation plays a role in the WM strategy of these companies, legislation is not the most critical driver for WM practices as firms pursue WM for other reasons such as, cost reduction, company sustainability agenda, client demands, company image, and industry benchmarking. The research concludes that, to ensure sustainable management of CD&E waste, more attention should be directed at these other reasons for which firms manage waste. For legislators, proactive enforcement approaches which can detect and prosecute for non-compliance will make legislation a key driver. Legislation should also be tied to financial incentives and targets should include the client whose demands act as a key driver. For clients to make more inputs, their demands can also be tied to cost implications as this is the number one driver for contractors. For contractors, sustainable WM should be pursued as it makes good economic sense through cost reduction on projects and increase in the possibility of winning work from environmentally aware clients.

Keywords: construction and demolition waste, drivers, waste legislation, waste management practice, waste management strategy.

INTRODUCTION

Studies on environmental management (EM) suggest there is the need to control the pollution of the environment and the management of resources to ensure sustainable development is achieved (Barrow, 2004, p.12; Mohammad, 2013). A key aspect of EM, which targets decoupling environmental pollution from the level of development, is the management of waste. In this regard, the construction industry is considered key because of the environmental and social impacts that occur at each stage of the

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construction ‘lifecycle’; from the extraction of raw materials, through processing, construction, demolition and recycling, to final disposal (Craighill and Powell, 1996). Construction activities such as excavation, building and civil works, site clearance, demolition, road works, and building renovation are the main causes of waste generation in the construction industry (Tam, 2008). The contribution of construction, demolition and excavation (CD&E) waste to the total waste stream in any developed economy is between 10 and 40% (Lu and Yuan, 2011). The concern for these high levels of CD&E waste is multiple folds: running up a large amount of land resources for waste landfilling (Jaillon *et al.*, 2009); harming the surroundings by hazardous pollution; wasting natural resources (Yuan and Shen, 2010) and increase in the cost of construction projects (Hao *et al.*, 2008). For these reasons, CD&E waste management (WM) has become an established discipline worldwide (Lu and Yuan, 2011).

One of the major accusations levelled against the construction industry is the excessive consumption of global resources (Curwell and Cooper, 1998; Ding, 2008). This accusation, puts increasing pressure on the industry to find ways of reducing the over reliance on natural resources. The promotion of EM, coupled with the mission of sustainable development has resulted in pressure demanding the adoption of appropriate methods to improve environmental performance of the construction industry (Udawatta *et al.*, 2015). The Sustainable development paradigm has been one of the driving forces in shaping waste legislation and policy since the 1980s and has led to WM approaches embracing the three dimensions of sustainability; social, economic and environment (Strange, 2002; Yuan, 2012).

CONSTRUCTION WASTE MANAGEMENT AND LEGISLATION

Research on the subject of CD&E WM, report that WM legislation is one of the most critical factors to ensure the negative effects of waste on the environment are controlled (Osmani *et al.*, 2008; Jallion and Poon, 2008; Wang *et al.*, 2010; Yuan, 2013). The EU since 1992 has regarded CD&E waste as a priority waste stream leading to upsurge in WM legislation and increased pressure on the industry to manage waste. In the UK, waste legislation is derived from the EU regulatory framework (Burmer and Burch, 2005; Jordan, 2006). The overarching legislative framework for the WM in the EU is the EU Waste Framework Directive (WFD) (Directive 2006/12/EC on waste) which sets the obligations for member states on the collection, transport, recovery and disposal of waste. The amended Waste Framework Directive 2008 (Directive 2008/98/EC), sets the obligation for member states to take appropriate measures to encourage: the prevention or reduction of waste production and its harmfulness; and the recovery of waste by means of recycling, re-use or reclamation or any other processes with a view to extracting secondary raw materials, or the use of waste as a source of energy (DEFRA, 2012). Other Directives which affect CD&E WM are the Landfill Directive (1999/31/EC) and the Integrated Pollution Prevention and Control Directive (IPPC) (2008/1/EC). The aims of EU waste legislation are promoted by the EU WM principles (prevention principle, precautionary principle, polluter pays responsibility, and principles of proximity and self-sufficiency) and the EU waste hierarchy (Strange 2002).

The legislative framework for CD&E WM is shaped by sustainable development concerns such as; the need to reduce the level of pollution of the environment, the need to reduce the over reliance on and depletion of natural resources, and running out of space for waste landfilling. The EU waste legislation and policy set the goal to ensure 70% of all CD&E waste is reused, recycled or recovered by 2020. Notable

regulations in the UK transposing EU Directives are the Wastes (England and Wales) Regulations 2012, Environmental Permitting (England and Wales) Amendment Regulation (EPR) 2012 and the Hazardous Waste (England and Wales) Regulations 2005. The most recent CD&E WM specific regulation in the UK was the Site Waste Management Plans Regulations (SWMP) 2008 which sought to promote sustainable management of CD&E WM but this was repealed in December 2013 as part of the DEFRA red tape legislation challenge.

Waste regulations impose obligations on construction firms who devote resources to meet regulatory requirements. To sceptics, WM regulations is a major burden on industry and business (Jordan, 2006; Baldwin *et al.*, 2011), while supporters suggest regulations promise economic advantages and a green light to innovation (del Río Merino, *et al.*, 2010; Baldwin *et al.*, 2011).

The criticality of government legislation in driving sustainable WM is the ability to cause a behavioural change in the industry (Wang *et al.*, 2010). Studies by Jaillon and Poon (2008) and Karavezyris (2007) suggest that government plays a crucial role in promoting CD&E WM practices by enforcing policies for the whole industry. For a WM system to be sustainable, it needs to be environmentally effective, economically affordable and socially acceptable (Ye *et al.*, 2012; Yuan, 2012). This suggests that the drivers for sustainable WM within the construction industry may go beyond legislative demands to encompass social concerns and economic incentives. To determine the extent to which government legislation affects WM practices within the industry, this research investigates the drivers for WM within the UK construction.

This research is part of a PhD research at the Faculty of Science and Engineering within the University of Wolverhampton which seeks to investigate WM practices of construction firms in the UK.

METHODOLOGY

This paper reports results from a PhD research which uses a multiple embedded case study approach (Yin, 2014). Four companies were selected from a list of award winners from different awards schemes within the UK construction industry in 2013. The award winners selected for this research were from categories relating to sustainability and environmental management. Data on the drivers for WM was collected through interviews with sustainability and environmental managers or directors in the companies who have responsibility for WM at the corporate level of the companies. Documentary evidence on corporate level WM was also reviewed. The QSR qualitative data analysis software Nvivo10 was used as the main tool to help in data analysis process through coding (Miles and Huberman, 1994) of the interview transcripts and documents imported into the software. Through description, analysis and interpretation, stages of qualitative data analysis (Wolcott, 1994), the files imported into NVivo were coded based on three main coding styles, open, axial and selective coding. To ensure an in-depth analysis of the data, the coding process began with micro analysis of the interview transcripts and documents through open coding. The codes generated were grouped together through axial coding to form themes and subthemes which served as the main basis for presenting and discussion of the results.

ANALYSIS AND DISCUSSION OF RESULTS

The results of the analysis of the data indicate that, though the drivers for WM are not exactly the same within the four companies, they can be grouped under nine (9) common categories (themes). These are: benchmarking; client demands; company

vision/agenda; economic concerns; environmental concerns; legislation on waste; reputation and image; resource demands for WM; standards rating and support systems. (This is shown in the NVivo output below)

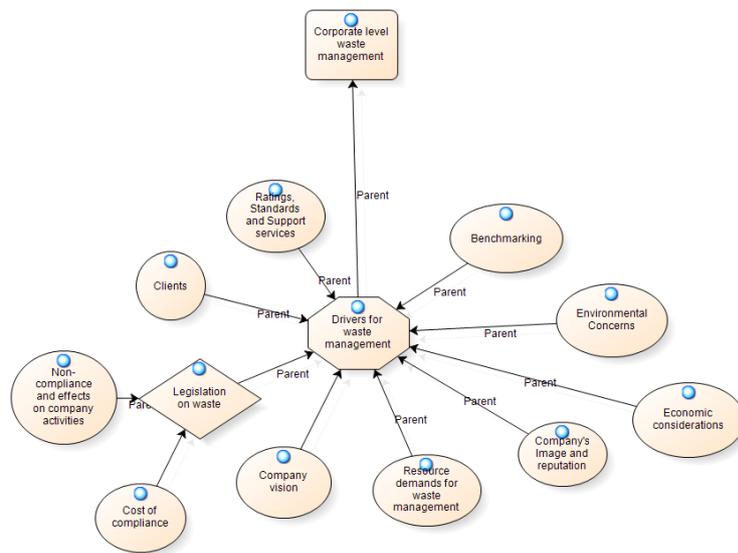


Figure 4 Drivers for waste management

Figure 1 above shows an NVivo output of the drivers of WM from all the companies involved in this research. The extent to which these factors drive WM differ from one company to the other.

The drivers in each company as shown in table 1 below are analysed.

Drivers for WM in company A

The highest internal driver in Company A is the company vision to be a sustainable company. This vision serves as the basis for all environmentally related activities within the company. The sustainability manager of the company describes the company's vision in the extract below:

At Company A, sustainability, it really is everything. Whatever our impact is, whether its construction, or maintenance, or anywhere we operate a business, we impact to community, or we deliver a programme of work and we engage with that community, we use materials and manage waste, everything we do is in our sustainability agenda.

Beyond wanting to be sustainable, the company's WM practices are driven by the need to ensure cost is reduced through sustainable material usage. Costs include cost of the materials, the cost of man hours put into the process, the cost for obtaining permits, the cost of transporting waste and charges for the landfilling or disposal of waste. The company considers sustainable WM as a means to cut down cost on construction projects. As a company poised to be industry leaders, benchmarking of their WM performance against other players in the industry is also a key driver. The desire to have a good reputation or image and the trickled down effect on business, acts as a driver of WM activities. The sustainability manager of the company suggested that image is not necessarily 'image' in the eyes of the general public but in the eyes of the client. The demands of clients for specific WM targets or outcomes, (BREEM ratings) is also seen as a major driver for WM within the company.

Environmental concerns also drive WM. The policy to do well for the environment is also seen as a social or moral responsibility as the company recognises the effects of its activities on the environment and the need to curtail such efforts. Legislation as a key driver plays more of a secondary role. This is because, the company reckons they are environmentally friendly and regard legislative demands as pushing for a similar outcome.

Table 1: Drivers of waste management practices in all four construction companies

	Internal Drivers	External Drivers
Company A	Company Sustainability (vision)	Benchmarking of activities
	Cost considerations	Client demands
	Company image/reputation	Government legislation
	Moral and social imperatives	
	Resource availability	
Company B	Cost considerations	Client demands
	Company image/reputation	Benchmarking of activities
	Environmental concerns	Government legislation
	Resource availability	
Company C	Cost considerations	Government legislation
	Company image/reputation	Benchmarking of best practices
	Environmental concerns	Client demands
		Environmental standards
Company D	Cost considerations	Client demands
	Company image/reputation	Government legislation
	Environmental concerns	Benchmarking of best practices
	Moral and social imperatives	

NB: Internal drivers of WM refer to drivers largely dependent on the factors that exist within the control of the company whereas external drivers are drivers outside the control of the company. Drivers are in order of importance based on emphasis by the interviewees.

Drivers for WM in Company B

A key driver of WM in Company B is the concern for the environment and the quest for sustainability. The company has an aspiration to develop a business that has zero impact on the environment through a cradle to cradle approach (Company sustainability report) and this drives to a large extent WM in the company. Sustainability is an integral part of the company's business and the aim is to be able to deliver sustainable solutions to the client. This makes client demands also a very important aspect of WM within the company. Both the environmental policy and resources management plan of the company emphasizes the client as an integral part of their WM agenda. Another key driver of WM practices within the company is cost considerations. The company regards WM as having potential cost savings. The senior environmental manager of the company summed up the relevance of WM to their company in the statement below:

'And how is it relevant to the business? So, by showing that we're a responsible company, it gives us a competitive advantage, potentially, to say that we can reduce

waste and save costs on construction sites and we've got proof to demonstrate that we've reduced waste over time. Also, a lot of clients are starting to have high targets for waste diversion from landfill or, in some cases, zero waste to landfill aspirations, so we can demonstrate that we're working towards that too. I think that's about it.

The company sees government legislation on waste as a key driver of their WM practices. By principle, the environmental policy of the company proposes compliance and beyond compliance where possible (with environmental legislation) as a driver of their activities. For the company, legal compliance has both financial and social impacts and the company makes sure WM practices are in line with compliance demands.

Drivers of WM practices company C

For Company C, the number one driver for WM is financial concerns. This is because the company sees waste generation as a huge financial wastage and puts in every measure possible to reduce the cost of waste to their projects. The company recognises government legislation as a key driver for environmental management and this to a large extent drives the WM practices of the company. As the environmental manager explains, though cost is a key factor, compliance with legislation will not be traded for financial reasons. She ranks legal compliance and cost as the two most important drivers for WM:

I think, in construction, the legal and the finance are equal. Yes, we have to be legal compliant, and providing that one ticks the boxes, the next one is, definitely, finance. Finance would not take over legal compliance.

For company C, client as a driver of WM practices is more of a reputational concern. For the company to be able to attract and win contracts, the company ensures waste is managed sustainably to give the company a good reputation (image). Having a good reputation affects the business you get and this drives WM. Standards and support systems like ISO 14001 also drive WM though according to an interview with the company's environmental manager, these standards do not change much of what they do as a company. The feel good factor with being a contributor to environmental protection is another driver for WM as this company views WM as a moral and social concern. Before the feel good factor is the availability of resources to manage waste. As explained by the environmental manager, managing waste comes with resource demands (human and material resources) and this drives the WM practices.

Benchmarking is another driver for WM within the company as the company reports their performance to UKCG so they can be compared against the industry performance.

Drivers for WM in Company D

The number one driver for WM practices in company D is client demands and this is due to of the type of clients the company deals with. Unlike Companies A, B and C, company D is a management contractor and has a lot of high-street brands as clients. These clients usually set the targets for the levels of waste generation and management. These companies (clients) are more interested in broadcasting their contributions toward environmental management. Such clients expect the contractor to sustainably manage waste to enable them publish their performances in CSR reports. Cost of waste generation is the second most important driver for the company. The company views material wastage as a waste of money and accepts managing waste makes good business sense.

Company image is a key driver for WM for two main reasons: to show the general public that the company is responsible; and to serve as a means to win contracts (from environmentally inclined clients). To show they are a responsible contractor, the company has registered with the considerate contractor's scheme so their activities can be audited. Benchmarking also drives WM practices just like the other companies to show they are doing better than their competitors in the industry. The environmental manager simplifies these drivers in this sentence:

In terms of our organisational structure, I would say, at board level, we're interested in overall project figures meeting customer targets and being able to compete with other contractors and say 'we're actually doing better than you do' kind of thing.

The company regards legislation as a move towards environmental management (protection) and puts in place measures to ensure compliance is achieved at all times. Due to the company's strong commitment to environmental protection, legislation automatically becomes a driver as it seeks a common environmental outcome. It was also gathered that the company due to their commitment to environmental protection sees WM as a moral and social responsibility.

Extent of effect of WM legislation on WM

As can be seen from the analysis above, the drivers for WM practices are multiple fold (Morrissey and Brown, 2004), and the role of legislation in each company differs to a large degree. Whereas for companies like C and D rank legislation as a key driver (Osmani *et al.*, 2008), companies A and B give a lower ranking to legislation as a driver of their WM practices. Though some of companies suggested that legislation is not a key driver for WM in terms of driving activities, all the firms still had structures in place to ensure compliance with government legislation. For this reason, this research investigated the main role played by legislation and the following results emerged.

The results indicate that, compliance with legislation affects the ability of the companies to win work in a number of ways due to its effects on the image of the companies. As deduced from the companies, a history of non-compliance and subsequent persecution for non-compliance are requirements to be reported in bids for new contracts. According to the interviewees, such incidents become a dent on the image of the company and can be the difference between winning a project and losing one. For this reason, there is always the need to ensure legal compliance. This point of non-compliance having a toll on business of the company was summed up by the senior environmental manager of company B in the extract below:

The main reason to comply with legislation, above all, is the risk to future business. If you are prosecuted as a company, there's a massive black mark on your record, which you then have to report in most prequals and tenders that you send to prospective clients. So the prospective clients will say 'have you been prosecuted at all in the past five years?' It's a companywide thing as well, if one site causes a pollution incident, or a breach of waste legislation, then it's a black mark for the whole of the company, it's primarily because of the risk of public perception and winning future work.

All other interviewees shared similar concerns on the effect of non-compliance on the business of their companies. This suggests that the role of legislation in sustainable WM in the construction industry goes beyond just meeting regulatory demands (Morrissey and Browne, 2004). The effects and motivations to comply with legislation are multiple fold and these occur through a complicated cause and effect manner.

IMPLICATIONS OF RESULTS

The results imply that the main drivers for WM in the construction industry, especially for large firms as used in this research, go beyond government legislation (as reported in previous research Osmani *et al.*, 2008; Lu and Yuan, 2010; Wang *et al.*, 2010) and encompass multiple fold drivers (Morrissey and Brown, 2004). As ranked in Table 1, economic concerns, company vision, image and reputation, environmental concerns, and resource availability are the major internal drivers that push companies to manager waste whiles client demands, benchmarking and government legislation are the main external drivers. Cost as a number one driver for WM is not surprising as there is evidence to suggest that on the average about 21-30% of all cost overruns on construction projects can be attributed to material wastage (Udawatta *et al.*, 2015). Hao *et al.*, (2008) also report that due to the profit maximizing nature of firms, cost affects their willingness to adopt environmentally friendly measures. On the issue of client demands driving WM, Manowong (2012) found that clients perceive waste as an extra expense on projects. It is not surprising then that some clients are switched on to the issue of WM. Research by Udawatta *et al.* (2015), suggest that company policies are more influential in construction WM than legislation. Legislation however still has its place (either direct or indirect) as it has the ability to influence WM practices due to the reputational effects persecution for non-compliance has on companies. Negative reputation has a negative influence on image and ultimately the ability to win projects which leads to economic effects (decrease in profitability). For legislation to play this role effectively, the ability of legislators to detect and persecute non-compliance needs to be boosted.

CONCLUSION

As shown in the preceding discussion, there are many drivers for WM within the UK construction industry. These drivers can be grouped generally into economic concerns, client demands, company vision/agenda, reputation and image, environmental concerns, legislation on waste, benchmarking, resource demands for WM, and rating, standards and support systems. The extent to which these factors drive WM differ from one company to the other and these differences are mainly as a result of the vision of the company and the level of importance they attach to WM.

Though some studies have reported that government legislation is the most critical success factor for sustainable WM in the construction industry (Osmani *et al.*, 2008; Wang *et al.*, 2010), the results of this study suggests that, at least for the large firms used in this research, there are a lot more pressing drivers for WM than government legislation. Key among these are cost (financial concerns), client demands, reputation as a sustainable company, and the need to benchmark results against other industry players. Government legislation still remains a driver of WM practices but in most cases plays a secondary role as firms believe (in some cases) they go beyond legal compliance. The effect of legislation as a driver occurs through the negative image a company stands to suffer should they be prosecuted for non-compliance and the trickled down effect of not winning work (economic concerns).

Based on the reasons stated above, this paper recommends that greater attention should be given to these key drivers to move the industry closer to the goal of ensuring a zero waste economy is achieved. For legislation to play a key role in CD&E WM, enforcement strategies that can help detect and prosecute for non-compliance will be a major boost as firms are more concerned with the negative effect of prosecution. Legislation should also be tied to financial incentives and target clients

whose demands act as a key driver for WM. Due to the key role played by clients and the economic drive of contractors, clients can make greater input by tying WM demands to cost implications. For contractors, WM should be given more attention as it makes good economic sense: reduction in the cost of projects due to reduced waste generation; and a positive image which helps increase the possibility of winning work from environmentally aware clients thereby contributing to profitability.

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