

Delivering Workplace Pro-Environmental Behaviour Change Using Evidence-Based Practice

MSc Climate Change and Sustainable Development

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Abstract

Organisations are increasingly encouraging employees to engage in pro-environmental behaviour. Research interest in workplace pro-environmental behaviour is also on the rise, but links between academic work and interventions delivered in the workplace are currently lacking. This study takes a fresh approach by proposing an evidence-based framework for use by practitioners in the field of workplace pro-environmental behaviour. The research was conducted using a combination of literature analysis and empirical research from an Energy Champions programme at Birmingham Airport. The final framework identified ‘Organisational leadership’ and ‘Leadership’ as the two strongest influences of employee pro-environmental behaviour, and proposes companies should start by establishing organisational objectives that are supported in a top-down approach. ‘Support’ and ‘Motivation’ were also found to influence behaviour, but evidence in these areas appears more subject to context, and to maximise effectiveness interventions require internal evaluation. ‘Beliefs’ were the final indicator of workplace pro-environmental behaviour. Beliefs were influenced by organisational and leader activities, but also worked independently from other influences. The proposed framework provides workplaces with an evidence-based tool to improve the quality of workplace interventions. Further work is required to test and validate the framework.

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Table of Contents

1	Introduction	1
1.1	Context	1
1.2	Why Workplace Behaviour is Important	1
1.3	Low Carbon Maintenance and Buildings.....	2
1.4	Contemporary Research	3
1.5	Evidence-Based Behaviour Change Interventions.....	3
1.6	Research Aim	4
1.7	Objectives.....	4
2	Literature Review	6
2.1	Pro-Environmental Behaviour	7
2.2	Workplace Literature	8
2.3	Intrapersonal Factors	8
2.4	External Factors	12
2.5	Interpersonal/ Social Factors.....	16
2.6	Context	19
2.7	Multi-Level Frameworks	21
2.8	Overview of the Research	23
2.9	Summary	25
3	Methods.....	27
3.1	Part One: Literature Selection.....	27
3.2	Part One: Factor Analysis	29
3.3	Part Two: Survey.....	31
4	Results	37
4.1	Factor analysis.....	37

4.2	Survey Results	53
4.3	Results Summary	61
5	Pro-Environmental Behaviour Change Framework	62
6	Discussion	63
6.1	Introduction	63
6.2	Factor Analysis	64
6.3	Survey	68
6.4	Behaviour Change Framework	71
6.5	Summary	72
7	Conclusions	73
7.1	Limitations	74
7.2	Future research	74
7.3	Summary	75
8	References	76
9	Appendices	88
9.1	Appendix One: Birmingham Airport Survey	88

List of Tables

Table 3.1: Search Term Keywords.....	28
Table 3.2: Databases Searched.....	28
Table 3.3: Subject Demographics	32
Table 3.4: Survey E-Mail Communication	36
Table 4.1: Papers Included in Literature Analysis	38
Table 4.2: Factor Long-List	44
Table 4.3: External Factors – Evaluation of Evidence for Stage Three.....	45
Table 4.4: Social Factors - Evaluation of Evidence for Stage Three.....	46
Table 4.5: Intrapersonal Factors - Evaluation of Evidence for Stage Three.....	47
Table 4.6: Stage Three-A – Are Factors Measurable, Changeable and Practical?	49
Table 4.7: Stage Three-B - Consolidating Factors with Overlapping Attributes.....	50
Table 4.8: Hierarchical Factor Selection.....	51
Table 4.9: Protection Motivation Theory Raw Data.....	57
Table 4.10: Correlations Between Dependent and Independent Variables.....	58
Table 4.11: Regression of Evaluation on PMT Variables.....	59
Table 4.12: Regression of Intention on PMT Variables	59
Table 4.13: Regression of Priority on PMT Variables.....	60
Table 4.14: Regression of Policy on PMT Variables.....	60

List of Figures

Figure 1.1: Depiction of Research Process	5
Figure 2.1: Model to Explain Variance Using TBP	9
Figure 2.2: Andersson's Adapted Value-Belief-Norm Theory	10
Figure 2.3: Conceptualising the Integrated Framework.....	22
Figure 4.1: First Choice Responses (%).....	54
Figure 4.2: Response Appeared in the Top Three Choice (% Respondents).....	54
Figure 4.3: Engagement in Energy Saving Behaviours	55
Figure 4.4: Engagement in Resource Saving Behaviours	56
Figure 4.5: Engagement in Sustainable Waste Management.....	56
Figure 5.1: Framework for Delivering Workplace PEB Change.....	62

1 Introduction

1.1 Context

There is international consensus for the need to reduce greenhouse gas emissions to minimise the impact of climate change (IPCC, 2014). The rise in atmospheric concentrations of nitrous oxide, methane and carbon dioxide (CO₂) since the pre-industrial era are recognised as the basis of planetary warming, and linked to growth in the human population, and increasing economic prosperity (Edenhofer et al., 2014). Intentions to act have become increasingly vocal, with world leaders recently agreeing to phase out fossil fuel use by the end of the century (Connelly, 2015). This year will also see the UN Climate Conference in Paris attempt to secure a universal climate agreement. But this sits against a backdrop where fossil fuels still account for 84 per cent of world energy consumption (BP, 2015), and greenhouse gas emissions continue to rise. Since the Kyoto protocol (UNFCCC, 1998) was produced in 1998 the action on climate change has consistently lagged behind the rhetoric. Ultimately, mitigation and adaptation to climate change is going to require action at every level, from international policy makers, to employers and industry, and citizens in their local communities (IPCC, 2014; European Climate Foundation, 2013; DECC, 2014a).

1.2 Why Workplace Behaviour is Important

Whilst day-to-day domestic behaviour receives much attention from policy makers when it comes to reducing our personal environmental impact (Whitmarsh, 2009), commercial and industrial activity are responsible for producing significantly more greenhouse gases emissions. For example, in the U.S. the combined commercial and industry sectors produce three times more emissions than the domestic sector (Lülfes and Hahn, 2013). A bias is also evident in the literature where numerous models have been produced to explain pro-environmental behaviour (PEB) in a domestic setting, but workplace behaviour is under-represented, and not fully understood (Blok et al., 2014). In the UK emissions from industry have decreased significantly

in the last 40 years, but this can largely be attributed to the demise in manufacturing and industrial output (DECC, 2014b). However, the business and public sectors are still responsible for more than a third of UK CO₂ emissions, and represent a significant opportunity to impact on the UK's total greenhouse gas emissions (Carbon Trust, 2005).

Business solutions for reducing emissions typically involve equipment and technology upgrades. These can produce significant and quantifiable changes, but typically the full potential of benefits will not be realised without associated action to change employee behaviour (Baddeley, 2012). What's more, the Carbon Trust have shown behaviour change programmes represent a 'low-cost, high-impact' way to reduce operating costs and reduce environmental impact. Workplace behaviour change also represents an opportunity for reducing emissions, as there is a low proliferation of initiatives within organisations, and evidence that staff show willingness to engage in PEBs (Carbon Trust, 2005).

1.3 Low Carbon Maintenance and Buildings

Environmental behaviour and technologies to reduce environmental impact are often set apart, when in practice there is a relationship between people and the technology they use (Cees J H Midden, Kaiser and McCalley, 2007). Low Carbon Maintenance and Buildings (LCMB) are a company providing facilities management, energy saving, and carbon management services to commercial and public sector organisations. Their work includes physical measures to improve the performance of buildings, and programmes to engage building users in energy saving. Technological changes typically start by ensuring metering equipment is capable of providing accurate data for different areas of a businesses estate, thereby allowing monitoring of changes to energy use to be accurately recorded. However, whilst this allows energy savings from technological upgrades to be quantified, for example, showing how much energy is being saved at base-load, it is much harder to apportion real-world energy savings to the behaviour change of building users, and even more so, to the programmes that have been run to facilitate behaviour change. According to

LCMB, this absence of objective analysis can reduce the appeal of behaviour change programmes, as it becomes harder to accurately assess return on investment.

1.4 Contemporary Research

Although modest by comparison to general environmental behaviour change research, there is a growing body of work looking specifically at workplace PEB. The literature can be loosely split into two categories; the first, of studies looking at specific behaviours and determinants, for example attitudes and recycling; and the second, reviews or broader studies that attempt to explain more complex behaviours through the use of multi-factorial frameworks. A theoretical framework can be used to explore observations, and should be able to provide a simple explanation of relationships between constructs relating to a behaviour (Anfara and Mertz, 2006; Connelly, 2014). A number of theoretical frameworks have been offered that seek to explain workplace PEB (Young et al., 2013; McDonald, 2014; Lülfs and Hahn, 2013; Tudor, Barr and Gilg, 2008), and these will be discussed in the literature review that follows.

1.5 Evidence-Based Behaviour Change Interventions

Whilst much work has been done over the last 10 years to extend our understanding of workplace environmental behaviour, it typically lacks practical relevance. This research will review the literature before analysing and reinterpreting studies in a way that can support more evidence-based practice for companies such as LCMB, who work in the field of environmental behaviour change. To help develop something of practical relevance a survey will also be conducted on an Energy Champions project currently being run at Birmingham Airport. Results from the literature analysis and Birmingham Airport survey will be assimilated to form a behaviour change framework.

This report starts with a literature review taking a broad look over the workplace PEB research, with a view to determining the strength of evidence for workplace influences on behaviour change. Determining the relevance of current publications to

workplace initiatives is necessary to meet the aims of this study, and the literature review will form the ground work for later analysis. The methodology (section three), explains the experimental process, including the analysis of literature and the survey that was conducted. Section four presents the results of the literature analysis and survey, and this is followed by presentation of the workplace behaviour change framework in section five. A discussion of the research findings and behaviour change framework is provided in chapter five, and the project conclusions and recommendations are offered in the final chapter.

In summary, it is recognised there is a lack of evaluation on the effectiveness of strategies to impact on PEB (Steg and Vlek, 2009), and there are limitations with previous work looking at PEB in the workplace (Carrico and Riemer, 2011). Working with LCMB this study aims to address gaps in existing knowledge, and produce results of practical significance to the industry.

1.6 Research Aim

To develop a framework that can be used to deliver and evaluate workplace pro-environmental behaviour change initiatives.

1.7 Objectives

1. To assess success indicators, environmental actions, and motivation in a workplace engaged in pro-environmental initiatives
2. To identify workplace behaviour change determinants that are measurable, effective, and practical
3. To establish a hierarchy of factors for prioritising workplace behaviour change programme initiatives

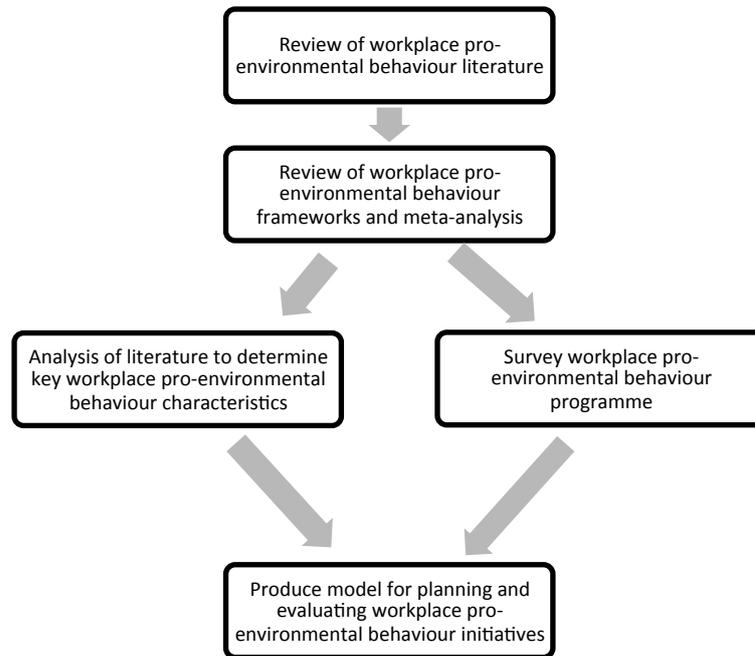


Figure 1.1: Depiction of Research Process

Figure 1.1 depicts the outline for the research. The objectives will be met by conducting an initial literature review, which will inform follow up investigations. The research will run in two parallel streams, with one analysing the literature (see Methods section 3.2), and the second collecting data from a workplace behaviour change intervention by means of a survey (see Methods section 3.3). Results from the two activities will then be interpreted to develop a framework for delivering workplace PEB interventions.

2 Literature Review

Climate change and environmental problems are strongly linked with the use of energy and resources (Karl and Trenberth, 2003; IPCC, 2013), which in turn is influenced by the behaviour of individuals (Vlek and Steg, 2007; Gardner and Stern, 2002). Therefore, understanding the drivers of environmentally significant behaviour in humans can inform behaviour change measures aimed at more sustainable living, and have a positive impact on the environment.

In recent years organisations have become increasingly interested in encouraging workplace pro-environmental behaviour (PEB), and at the same time workplace PEB has also been attracting increased attention from researchers (Young et al., 2013). Researchers have mainly focussed on behaviour change in specific behaviours (Young et al., 2013), although a number of studies have also produced theoretical models that attempt to explore the more complex interactions that determine human behaviour (Young et al., 2013; McDonald, 2014; Norton et al., 2015). However, to date researchers have not shown how the knowledge can be best applied to a workplace setting.

Low Carbon Maintenance and Buildings (LCMB) are a company providing facilities management, energy saving, and carbon management services to commercial and public sector organisations. Their work includes running workplace behaviour change programmes for clients including Birmingham Airport and the NHS. As part of this research a meeting was held with LCMBs Head of Carbon Reduction to gain industry insight into how workplace PEB is typically managed, and the challenges facing practitioners working in the field. LCMB reported the biggest challenges to be a lack of reference data for benchmarking behaviour, a lack of evidence on what works with regards to behaviour change interventions, and a lack of any consensus around how to define success in behaviour change initiatives.

The current literature fails to address these points, and the challenges identified by LCMB highlight a need for research that is more practically relevant. The purpose of this literature review was to evaluate the strength of current research for the various determinants of workplace PEB behaviour, consider how well the literature deals with the variable nature of workplaces, i.e. the external validity of studies, and identify where the gaps are in the existing literature, which will help determine the focus of this project.

The literature review will consider the behavioural determinants within the sub-categories of Intrapersonal factors, Interpersonal/ social factors, and External factors, as used by Tudor (Tudor, Barr and Gilg, 2008) and McDonald (McDonald, 2014). These categories were selected for their broad nature, and will help to guide the structure of this review.

2.1 Pro-Environmental Behaviour

The drivers of pro-environmental behaviour (PEB) are not straight forward, and there is often a disconnect between peoples' concerns and behaviour (Marshall, 2014). For example, the majority of people recognise that using the car less would have a positive environmental impact, and yet car use in the UK continues to increase (Park et al., 2013). Understanding the drivers of environmental behaviour has been of interest to researchers for some time. The *New Ecological Paradigm* (NEP) (Dunlap and Van Liere, 1978) for example, has been used for the last 30 years to help understand environmental concern (Hawcroft and Milfont, 2010), and has contributed to a number of other models that provide insight into how decisions are made. These models can also be used to help understand the process of behaviour change. The work by Stern (Stern and Dietz, 1994; Stern et al., 1999; Stern, 2000; Gardner and Stern, 2002) has been seminal in this area, not least for developing traditional models of attitudes and behaviour, such as the work by Ajzen (Ajzen, 1991) and Schwartz (Schwartz, 1977), into models better suited to explain environmental behaviours. Value-Belief-Norm theory (VBN) (Stern et al., 1999) is the best example of this. However, whilst it is generally agreed VBN theory provides

an attitude-behaviour model that represents environmental values, there is an argument the model is insufficient to explain environmental behaviours in a workplace environment (Christina et al., 2014).

2.2 Workplace Literature

Stern, Borden, and others have been researching PEB since the 1970's (Stern, 1978; Borden and Francis, 1978). However, research into workplace PEB is more recent. Austin (1993) looked at recycling behaviour in a large University, in what became the first of many papers on the subject (Marans and Lee, 1993; Lee, De Young and Marans, 1995; Tudor, Barr and Gilg, 2007b; Manika et al., 2015). More recently, a wide-range of factors influencing workplace PEB have been studied, with the most abundant body of literature looking at attitudes and intentions.

2.3 Intrapersonal Factors

For the purposes of this literature review intrapersonal factors were considered to be personal beliefs and attitudes, personal norms, and factors relating to motivation.

2.3.1 Theory of Planned Behaviour

It has been shown for some time that the Theory of Planned behaviour (TPB) (Ajzen, 1991) can explain workplace PEB (Cordano and Frieze, 2000), and the TPB continues to attract the attention of many researchers (Davis, O'callaghan and Knox, 2009; Greaves, Zibarras and Stride, 2013; Lülfs and Hahn, 2013; Blok et al., 2014). In all relevant cases that were identified for this review the TPB, or some of its constructs, were shown to explain a significant proportion of variance in the environmental behaviour of employees, although it is recognised in most cases TPB does not completely explain an individual's actions (Blok et al., 2014).

Much of the work looking at the TPB is conceptual (Lülfes and Hahn, 2013), however there are a number of authors who have collected empirical data. The research conducted by Greaves *et al.* (2013) related the TBP to specific real-world examples in a large UK media organisation. Energy saving (via computer switch-off), waste management (through recycling), and reduced business travel were studied, and whilst the TPB explained all behaviours, the degree of variance ranged from 46 per cent for travel, through to 61 per cent for energy saving.

The work by Greaves was of particular interest due to the consideration given to antecedent beliefs. As pointed out by the authors, much of the research in the field only answers the question of whether a particular theory fits a behaviour. Greaves also looked at why the TPB did not fully explain what happens in day-to-day activities. In the example of energy saving, by switching off computers at the end of the day, there was an antecedent belief that boot-up time was too long, and in some cases this belief was more influential than attitudes or social norms. This observation can be applied to other situations where environmental intentions do not lead to environmental action, and the author of this report has produced a basic model to summarise the relationship (Figure 2.1).

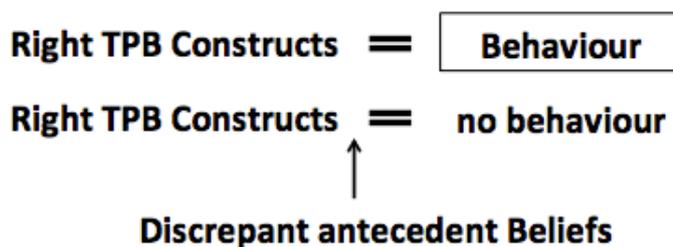


Figure 2.1: Model to Explain Variance Using TBP

The model proposed in Figure 2.1 is of practical relevance to leaders of workplace interventions seeking to encourage PEB, as it highlights the need for evaluation that can help to understand not only what drives PEB, but also what prevents it. In the example from Greaves, knowledge of what prevented the behaviour influenced

purchasing decisions for replacement computers, and led to technical upgrades which resulted in greater uptake of the desired PEB.

2.3.2 Antecedents of Behaviour in the Workplace Context

The TPB is not the only behavioural model studied by researchers in the workplace context. Zhang (2013a) looked at energy saving behaviour of office workers using the Norm-Activation-Theory (Schwartz, 1977), and the previously discussed Value-Belief-Norm (VBN) (Stern et al., 1999) has featured in a number of workplace studies (Andersson, Shivarajan and Blau, 2005; Scherbaum, Popovich and Finlinson, 2008; Christina et al., 2014). As shown with the TPB, the VBN can not fully explain workplace PEB. This led Andersson *et al.* (2005) to propose an adapted model based on their research looking at sustainability aspirations within a large multinational corporation (Figure 2.2).

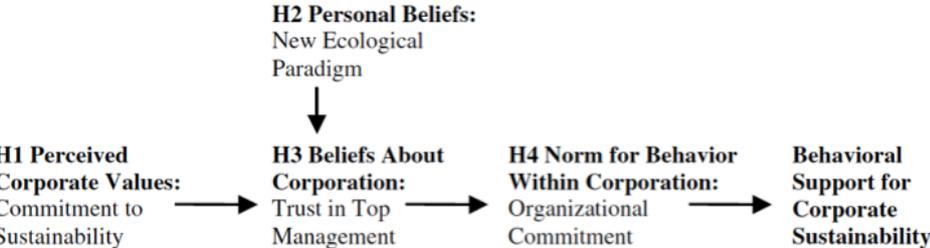


Figure 2.2: Andersson's Adapted Value-Belief-Norm Theory

Large multinationals are increasingly vocal with pledges to minimise their environmental impact, but Andersson told of a wide variety in reporting standards among the worlds 40 largest companies, a view echoed by more recent research showing significant variability around the reporting of sustainability (Perego and Kolk, 2012). The relevance of this dichotomy is the impact of organisational factors on the environmentally significant behaviour of employees. There is good evidence to show organisational factors subjugate person factors (Lee, De Young and Marans, 1995; Marshall, Cordano and Silverman, 2005; Cantor, Morrow and Montabon, 2012), and the work by Andersson, and subsequently Christina (2014), arguably

provides a model more suited to a typical workplace. Specifically, Andersson found in the organisational setting regular determinants of behaviour, such as personal values and beliefs, were muted by contextual factors including the organisations own values, and the social norms within the organisation.

2.3.3 Habits

Intrapersonal factors also considers specific drivers for behavioural action, such as habits and motivation. In contrast to behavioural models such as VBN theory, these antecedents to behaviour have received far less attention by researchers, and the influence of habits and motivation is not fully understood (McDonald, 2014).

Consideration of habits has typically been studied in the context of how it influences other factors. For example Schwartz (2010) looked at energy saving behaviour through Smart Metering, and found habits return to govern energy use behaviour unless continued support to an intervention is provided. Another recent study on energy saving used the TBP combined with habit to predict behaviour, and found intention to be the strongest determinant of printing behaviour, but habits more dominant in ‘switch off’ actions with lights and computers (Lo et al., 2014). Habits are recognised as significant influences of PEB but research into habits and workplace PEB is scarce. A better understanding of context is required in order to apply findings to other work situations (Lo et al., 2014).

2.3.4 Motivation

Motivation is more difficult to interpret due to a number of different classifications used by researchers. For example, external motivation is often reported in the context of rewards (Zhang, Wang and Zhou, 2013a; Handgraaf, Lidth de Jeude and Appelt, 2013). A good summary of the subject is offered by McDonald (2014), who includes motivation as part of a conceptual multi-level framework. McDonald also comments on protection motivation theory (PMT), which has not been raised by other authors (although threat and harm were mentioned by Zhang *et al.* (2013a)). PMT has been

proposed as a reason why there is a general lack of action in response to climate change among people (Marshall, 2014). PMT proposes our behaviour is a response to perceived severity of a threatening event, whether we can take action to counter the threat, whether our action would make a difference, and how likely the event is to occur. There is evidence that PMT influences PEB in the non-workplace setting (Bockarjova and Steg, 2014), and therefore it would be of benefit to understand if these same influences are observed in the workplace.

2.4 External Factors

External factors are influences on behaviour in the workplace setting and include organisational policies, regulations, and social environmental norms, along with PEB initiatives and activities. There is also an overlap with intrapersonal factors, as incentives and rewards offered by the organisation are considered part of this category, but also have a direct influence on extrinsic motivation.

2.4.1 Organisational Factors

There has been a reasonable amount of research in this area, and as previously discussed, there is considerable evidence organisational factors have a stronger influence on employee PEB than personal beliefs (Lee, De Young and Marans, 1995; Marshall, Cordano and Silverman, 2005; Andersson, Shivarajan and Blau, 2005; Cantor, Morrow and Montabon, 2012).

Research in this area often distinguishes between behaviours that are directed by the organisation and voluntary actions of PEB by employees. Voluntary actions have been referred to using a multitude of terms including voluntary pro-environmental behaviour (VPEB) (Lülfes and Hahn, 2013), extra-role behaviour (Ramus and Killmer, 2007), organisational citizenship behaviour directed towards the environment (OCBE) (Paillé, Boiral and Chen, 2013), and voluntary employee green

behaviour (VEGB) (Norton et al., 2015). For the purposes of this report voluntary pro-environmental behaviour will be used universally.

Voluntary PEB has been shown as a reciprocity response between actions of the organisation and actions of the employee (Lamm, Tosti-Kharas and Williams, 2013; Paillé, Boiral and Chen, 2013). In the studies by Lamm *et al.* (2013) and Paillé *et al.* (2013) VPEB was an indirect outcome of giving the right support for PEB, allowing employees independent decision making, and providing appropriate resources to engage in PEB where necessary. More widely any practices seen to be positive for the environment, such as producing company sustainability policies, also showed an increase in VPEB. Collectively these actions produce direct benefits to the organisation through resource savings (using less paper, less traveling, energy conservation) (Lamm, Tosti-Kharas and Williams, 2013). However, declarations of being a pro-environmental organisation need to be substantive, as Paillé *et al.* (2013) found an inverse reaction in VPEB when organisations produce pledges without successive action.

Norton *et al.* (2014) also found a relationship between perceived presence of organisational sustainability and VPEB. The results support Paille and Lamms finding, that perceptions of organisational behaviour influence employee pro-environmental actions. However, looking closer at their data reveals subtleties within the results that have not been reported in other research. The perception of the organisations green work climate was only associated with task-related PEB, and a perception of colleagues green work climate was also required as a mediator to increase VPEB. This is saying VPEB was not observed in response to a perceived positive organisational action on sustainability, potentially conflicting with the results of Paille (2013) and Lamm (2013). An explained for this difference may be that Norton's use of green work climate is more clearly defined than the term 'perception of organisation pro-environmental values', as used in the studies by Paillé *et al.* (2013) and Lamm *et al.* (2013). The perception of organisational pro-

environmental policy with VPEB may be more complex than previously assumed (Norton, Zacher and Ashkanasy, 2014).

2.4.2 Organisational Interventions

In order to promote employee PEB organisations use a range of initiatives including activities to encourage PEB, and measures to disincentivise behaviour that has a negative environmental impact (for example parking charges and restrictions). One of the outcomes from our meeting with Low Carbon Maintenance and Buildings (LCMB) was a lack of evidence-based practice around what works in terms of workplace behaviour change initiatives. This same issue has been highlighted in the research (Cox et al., 2012).

2.4.3 Travel Initiatives

Of the three behaviours most commonly targeted in workplace environmental initiatives; energy saving, waste management, and travel, it is suggested changing travel behaviours is the most challenging (Cox et al., 2012). Organisations use a number of measures to encourage travel behaviour change, the most common include information, marketing and promotional campaigns, incentive schemes, and travel planning (Cairns et al., 2008). One of the differences to changing other environmental behaviours is the perception of how difficult it is to change, and it has been shown that irrespective of travel mode employees generally feel they do not have other options (Lo et al., 2013). Even in a cycle friendly country like Holland, which has the highest percentage of journeys by bike in Europe (Bassett et al., 2008), organisational attitudes to active travel vary. This has been shown to result in different attitudes among employees, creating a different social norm and increased car use (Lo et al., 2013). A positive interpretation of this is changes in employee attitudes are possible from changes in organisational attitudes, and there is evidence changes can have quick results for a relatively low cost (Cairns, Newson and Davis, 2010).

Cairns and colleagues also provided justification for organisations to provide travel planning for employees, and from an examination of 20 workplace case studies, they showed an average drop in commuter journeys of 18 per cent (Cairns, Newson and Davis, 2010). However, a critical review has called into question much of the work in this field, suggesting weak research design and a lack of external validity undermines the majority of studies (Möser and Bamberg, 2008). Over 150 papers were included in Möser's meta-analysis, but many had insufficient, or no, statistical analysis. Möser pooled and reanalysed the data, and still found significant benefits of transport measures (for example workplace travel plans increased non-car journeys by 12 per cent), but commented that methodology issues could not be overcome by the reanalysis and future work requires much stricter methodology if it is to be of practical relevance. Möser's review is pertinent to much of the workplace PEB literature, as many of the methodological issues highlighted are seen in other studies covered in this review.

2.4.4 Green Champions

Another popular initiative is to form a team of green champions (also known as energy champions), who are individuals within an organisation given responsibility for engaging colleagues in PEB, and setting an example with their own behaviour. Despite being a familiar feature of sustainability projects with environmentally conscious employers, there is a lack of research into the success of green champion interventions (Taylor, Small and Hargreaves, 2012). The role of a green champion often has no common definition, but activities can generally be grouped into four categories; role models, educators, facilitators, and coordinators, with some champions fulfilling one of the roles, while others perform multiple functions (Taylor, Small and Hargreaves, 2012). In the one detailed report on the subject formality of the role was recognised as important when relating to outcomes, along with access to resources, some authority to take action, and an ability to communicate with senior decision makers (Taylor, Small and Hargreaves, 2012). However, this report was conducted in the education sector, and with no data from other sectors it would be presumptive to generalise these findings. The more supportive organisations also showed better results, with good communication and

champions from a wide range of the organisations department, being two key features. Finally, the authors stressed the importance of programmes being incorporated in the organisations environmental policies, being part of a wider ‘green culture’, and having a set of clearly defined objectives (Taylor, Small and Hargreaves, 2012).

Another report looking to examine the lack of evaluation in workplace PEB interventions was commissioned by the Scottish Government, Defra, and the 2020 Climate Group (Cox et al., 2012). The Cox report aimed to identify what works in workplace interventions, seeing potential to increase engagement in pro-environmental initiatives from the 20-50 per cent of employees that typically take part (Cox et al., 2012). The report used a mixture of research literature and case studies from 20 companies to make their recommendations. Despite the reports declared purpose being to address the lack of quality evidence, many of the recommendations were still based on existing literature, or reports from case studies, without any new empirical analysis. For example, green champions were considered to be an effective tool for behaviour change, but this was based on a small body of literature, and some of the case studies in the report had actually ceased running green champion programmes for reasons including not being able to release employees from their general duties, and cost saving (Cox et al., 2012).

2.5 Interpersonal/ Social Factors

Interpersonal and social factors refer to interactions within the workplace, primarily with supervisors and managers, but also including colleagues. Feedback is also a behavioural determinant within this category.

2.5.1 Leadership

Graves *et al.* (2013) and Robertson and Barling (2013) both looked at transformational leadership style and links to employee PEB. Graves also

incorporated external motivation within their study. Both Graves *et al.* (2013) and Robertson and Barling (2013) found environmental transformational leadership increases employee PEB. Employees PEB was influenced independently by managers transformational leadership and managers own PEB, and Robertson showed transformational leadership indirectly encourages PEB through shared values, helping employees think about issues in new ways, establishing closer relationships with employees, and giving confidence to staff that they can achieve goals. Results showed positive environmental behaviour demonstrated consistently by managers will impact on the actions of subordinates (Robertson and Barling, 2013).

2.5.2 Links to Motivation

In addition to supporting the findings reported by Robertson, Graves *et al.* (2013) also revealed interactions with motivational influences. Using self-determination theory, autonomous motivation and external motivation were linked with transformational leadership to look at predictors of PEB. Results showed transformational leadership positively related to both types of motivation in relation to PEB, but external motivation was moderated by transformational leadership. That is, external motivation influences PEB, but only when under the right leadership conditions. The link was such that the influence of external motivation was proportional to the level of transformational leadership provided. This link is significant when considering rewards and green behaviour, as research has shown mixed results with extrinsic rewards. The relationship with autonomous motivation was also moderated by the degree of transformational leadership provided. The authors proposed leaders expressing strong environmental values and goals are likely to influence the adoption or strengthening of environmental values in employees.

2.5.3 Influence of Supervisors

Tying together organisational commitment and influence of leaders, Cantor *et al.* (2012) reported findings consistent with those previously described; that there is a strong association between perceived organisational support for the environment and

employees PEB (Cantor, Morrow and Montabon, 2012; Paillé, Boiral and Chen, 2013; Lamm, Tosti-Kharas and Williams, 2013). The unique part of Cantor and colleagues work was looking at who within an organisation has the greatest impact on employee PEB. In their results supervisors and immediate line managers had a greater impact than top level managers. This is theorised as being due to supervisors playing a more visible role, being able to influence employees perception of organisational commitment, and provide the necessary resources to engage in environmentally friendly practices. In separate research using social exchange theory, it has also be shown co-workers have a positive influence on PEB (Paillé et al., 2015).

2.5.4 Feedback

Feedback has also been shown to positively effect employee PEB (Staats, Van Leeuwen and Wit, 2000; Schwartz et al., 2010; Cantor, Morrow and Montabon, 2012). Researchers have looked at feedback using technology, for example using desk based monitors to report on energy use at an individuals workstation, through literature dissemination, and feedback received directly from superiors. In a study of office heating practices staff were given written advice on how to use radiators more effectively. Feedback was then provided via notices and brochures on how well the advice was being followed. A one year follow up showed the four weeks of feedback had increased the number of people correctly using the heating from 30 per cent at base-line to 50 per cent one year later. The intervention was then repeated for another four weeks, and another year on 60 per cent of employees were following the advice given (Staats, Van Leeuwen and Wit, 2000). This study is one of few that has included long-term follow up, and provides a number of useful outcomes, including that written feedback is an effective form of communication in influencing employee PEB, and repeating an intervention can reinforce behaviours and increase overall engagement.

Feedback on group level energy use reported on a monthly basis has shown a reduction of seven per cent (Carrico and Riemer, 2011), and in another study

feedback has been given credit for significantly reducing construction waste (Lingard, Graham and Gilbert, 2001). However both studies failed to report long-term follow up. Murtagh (2013) showed initial reductions in energy use when staff were supplied with individual feedback, but these energy savings diminished over 18 weeks of follow up. This exposes another weakness of the research generally, where most behaviour change is judged over short periods of six months or less.

2.6 Context

This review has presented literature showing the influence of organisation culture, leadership, and interventions on workplace PEB. However, for most topics the number of studies is small, and the majority of studies have taken place in educational establishments and office buildings. For companies such as LCMB working in the field, clients come from a range of sectors, and therefore it is beneficial if studies are producing results with external validity. However, many of the studies presented in this review have not been replicated in different circumstances, or when they have, results are not in agreement. This suggests context is an important consideration when interpreting results.

2.6.1 Organisational Sector

Marshall *et al.* (2005) looked at the U.S. wine industry, as the sector has been going through a transformation relating to environmental stewardship. The Marshall paper examined external influences on the organisation in addition to organisational influences on employees. The authors showed even within the same sector behavioural drivers varied between companies. The typical picture appeared to be one where initial action was driven by regulatory measures, but later environmental measures became part of an organisations values. The importance of managers is emphasised, as where the organisation had adopted pro-environmental attitudes, the impact on employees was mediated by the attitudes of managers. Although research in other fields has shown organisational behaviour can have a direct impact on employee PEB, it was shown in the U.S. wine industry action requires the mediating influence of management. Whilst the wine industry might be considered a special

case, the results demonstrate that findings can not automatically be applied across all workplaces.

Another sector generally overlooked in much of the research is the small medium enterprises (SMEs). This is despite the fact they account for 99 per cent of European businesses (European Commission, 2014). The 2007 paper by Masurel (Masurel, 2007) looked at why SMEs invest in environmental measures, which are disproportionately more expensive for small firms compared to large companies. Across SMEs generally, they found the main drivers for pro-environmental engagement were to improve working conditions and safety (through the upgrading of equipment), followed by legislation, and moral duty. SMEs generally believed environmental benefits should be looked at as an indirect benefit of other actions, and not just an activity in its own right (Masurel, 2007). These motivations differ somewhat to the larger organisations in this review, and again highlight the need to interpret workplace behaviour in the right organisational context.

2.6.2 Other Examples

Conflicting results have also been seen when looking at rewards and externally motivated behaviour. A number of studies have looked at financial incentives and typically these have been ineffective in encouraging PEB change (Zhang, Wang and Zhou, 2013a), with one case even showing a reduction in PEB (Handgraaf, Lidth de Jeude and Appelt, 2013). In the study by Handgraaf *et al.* the authors suggested monetary incentives may ‘crowd-out’ other motivating factors, and showed social rewards (via praise and acknowledgement) were much more effective. However, Tam (2008) presented data for a major construction project where workers received payments based on an index of materials used and waste sent to landfill. The incentive scheme reduced waste by 23 per cent, thereby demonstrating in some situations financial rewards can be a useful tool. The difficulty is understanding why the results are different when a number of variables have been changed. For example, it could be down to the work sector, cultural differences, relative scale of rewards, or many other factors including how the research was conducted.

2.7 Multi-Level Frameworks

A constant theme throughout this review has been the interlinking of factors when trying to offer predictors of PEBs. Most studies have focused on just one or two determinants, but collectively in the papers studied for this report over 50 different antecedents to PEB have been identified. In a bid to offer a more holistic explanation of workplace PEB, there has recently been a number of frameworks and review papers written (Young *et al.*, 2013; McDonald, 2014; Inoue and Alfaro-Barrantes, 2015; Norton *et al.*, 2015). Looking at these studies in more detail provides a useful summary of current understanding of the subject area, and provides guidance on how the research agenda might be taken forward.

Young *et al.* (2013) produced a literature review of organisational behaviour change initiatives, using only evidence from directly measured indicators, thereby circumnavigating the common methodological weakness of self-reported behaviour. Seventeen publications met the inclusion criteria and the concluding factors (factors shown to influence PEB) were initially related to the theoretical framework developed by Tudor (Tudor, Barr and Gilg, 2008). The Tudor framework did not cater for all the factors identified by Young, and was adapted to create a new, more robust model. Young came up with four categories for decision making: individual, organisational, group, and external factors. Within each category a number of factors are present, for example the category 'Individual' includes environmental attitudes, environmental awareness, and feedback. The development of Young's model incorporates a wide number of behavioural factors and can be applied to all workplace pro-environmental action, where the previous model of Tudor was specifically designed to explain waste and recycling. The use of categories provides a mechanism to target interventions at multiple levels, thereby improving outcome prospects, and the use of studies based on test-retest data arguably increases the academic rigour of their results, although at the expense of a relatively low number of papers in the final review. Overall the Young review made a valuable contribution to the literature, for which future work could build on.

The McDonald review (McDonald, 2014) set out to combine what is known about general pro-environmental factors with the research on workplace factors to create a more complete model that can be applied to the organisational setting. McDonald recognised Young *et al.* (2013) had addressed shortcomings of previous work and created a more complete model, but identified non-rational and social dimensions were still missing. McDonald claimed the ‘full picture of workplace PEB has so far not been fully documented’, and devised a completely new framework based on the findings of 25 key papers, short-listed from an initial 114 workplace PEB publications. McDonald’s framework is the most complex example of workplace behaviour models, and contains twenty one different factors with a number of interacting variables (Figure 2.3).

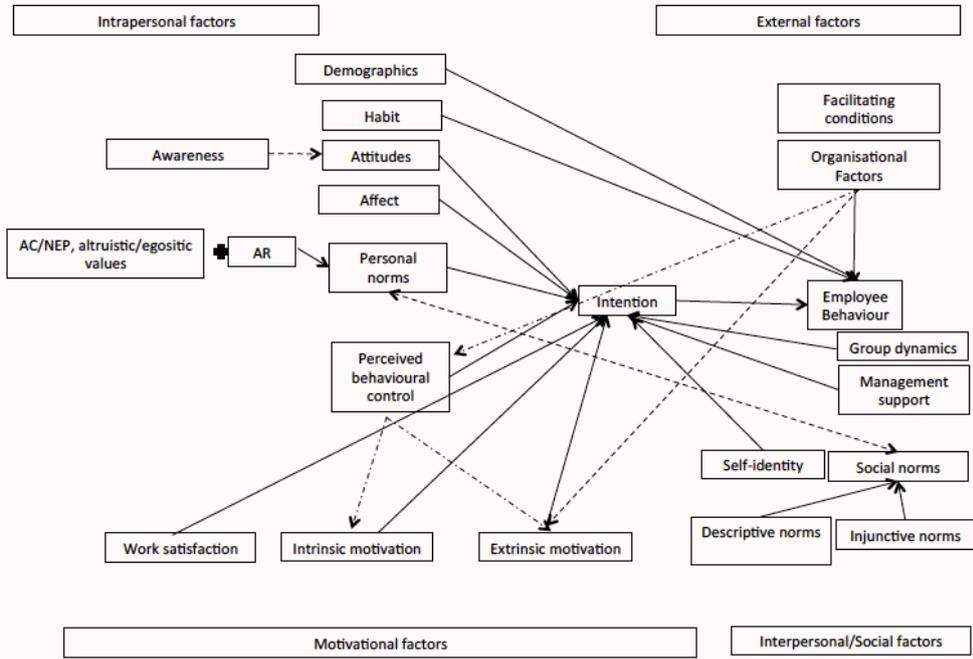


Figure 2.3: Conceptualising the Integrated Framework
 Reproduced from McDonald (2014)

One of the main differences with McDonald’s framework and previous models is that motivational factors have their own category. It is argued this is necessary as motivation includes a number of relevant factors, with connections to perceived behavioural control, which is more typically reported as an intrapersonal factor.

As a sign of interest currently being shown in this field of research, two review papers have already been published this year. The most of notable of these proposes another conceptual framework, but differs in so far as making clear distinctions between required and voluntary workplace PEB (Norton et al., 2015). Nearly 500 papers were considered, with 69 publications selected for the final review, making this the most comprehensive look at the subject to date. The conclusions reached by Norton and colleagues support what has become apparent during this report, namely, there is a lack of multi-level research and a focus on pre-cursors of behaviour rather than outcomes. Outcomes are of interest in this research project, as working partnership with LCMB has revealed a real-world need to understand how success is defined and measured. Norton suggests practitioners need to demonstrate positive outcomes from behavioural interventions, demonstrate costs savings for the organisation, report on the effectiveness of leadership, and assess the intrinsic satisfaction of employees. The research conducted in this report will seek to address this need.

2.8 Overview of the Research

2.8.1 Current Status of Workplace PEB Research

It has been claimed workplace PEB is an area which has not received much attention from researchers (Blok et al., 2014). What this review has found is there has been a reasonable amount of research activity, and this has built rapidly in recent years, with the majority of publications considered for this study being written after 2010. However, because of the wide nature of the subject, and complexities of behaviour, the research is spread very thinly, and there is a lack of depth in all specific behavioural predictors, as well as into more complex explanations of multi-level behaviour. There is also very little evidence to inform working practices for practitioners operating in the field of workplace behaviour change.

2.8.2 Research Quality

It is also concerning that much of the work suffers from methodological issues and a lack of external validity (Scherbaum, Popovich and Finlinson, 2008; Kormos and Gifford, 2014). Two meta-analysis, one looking at waste management behaviour (Oke, 2015), and the other looking at travel interventions (Möser and Bamberg, 2008), reported similar concerns around methodological issues. Both authors reported a lack of control groups, and highlighted that studies regularly rely on self-reported behaviour. A meta-analysis examining validity in self-reported PEB concluded accuracy is poor as the effect size was functionally small for testing theories and devising intervention campaigns (Kormos and Gifford, 2014). Oke and Möser stress that future work needs greater external validity in order for findings to be of use in environmental campaigns.

2.8.3 Protection Motivation Theory

As previously mentioned, the McDonald review paper (McDonald, 2014) specifically highlights the importance of motivation at a PEB. As there is no evidence of protection motivation theory influencing behaviour in the workplace setting, and it is not explicitly included in McDonald's framework, it appears at odds with the rest of the content in McDonald's review. However, the lack of research does not mean that research is not needed; indeed the fact there are known links to general PEB (Bockarjova and Steg, 2014) provides justification for investigation of this domain. For this reason the research conducted for this report includes a pilot study incorporating PMT, which should help identify if this is a subject deserving of further research attention.

2.8.4 Literature Review Scope

The framework developed by McDonald (2014) (Figure 2.3) gives an indication of the complexity of the workplace PEB domain. To meet the objectives of this project the literature review needed to consider all the areas shown in McDonald's framework, and therefore has provided an overview of the subject. Due to this demand it was beyond the scope of the report to explore any one area in detail.

2.9 Summary

Unsworth, Dmitrieva and Adriasola (2013) claimed theories focussing on values and specific environmental behaviours are not impacting on workplace PEB change programmes, and this review has presented a number of examples to support their claim. We have also discussed up-to-date literature that supports earlier research, and shows the importance of context in influencing PEB (Corraliza and Berenguer, 2000). It is generally agreed in the research that combining existing theories is a promising approach (Lülfes and Hahn, 2013), but the frameworks that have been developed to date are academic in nature, and lack the flexibility required to support real-world situations where context is always changing. Despite all the work that has been done there is still no clarity over what works in terms of workplace PEB interventions (Cox et al., 2012). Insight from LCMB, who are practitioners working in the field, have told us of a need for information that will help inform and plan workplace PEB change programmes, establish benchmarks, and evaluate success.

In the current form, existing literature can not provide the information required to meet the aims and objectives of this research project. The frameworks offered by Young *et al.* (2013) and McDonald (2014) have helped to explain the interrelationships between influences of behaviour, but outcomes can not be easily applied to a workplace context. The categories used in the theoretical models, and the use of Intrapersonal Factors, Interpersonal Factors, and External Factors used to structure this literature review provide a broad classification to help organise the multitude of sub-categories, but are not user friendly for practitioners looking to design workplace PEB interventions. Therefore, the conclusion of this literature review is that a reanalysis of the existing literature is required in order to identify the factors most relevant for workplace behaviour change programmes. This will involve rating factors for their practical relevance, for example to ensure workplaces focus on factors that can be influenced by interventions, and are cost effective and straight forward to deliver. The other main difference to previous work is the framework developed for this research would offer a hierarchy of measures, guiding practitioners through a pathway that focuses on the most effective measures first.

3 Methods

The research was conducted in two distinct parts. Part one was a comprehensive analysis of the literature to determine the key factors relating to workplace pro-environmental behaviour (PEB), and is described in section 3.1 and 3.2. Part two was a survey with staff at Birmingham Airport looking at employees environmental behaviour and attitudes, which is described in section 3.3.

The objective of the part one analysis was to identify key factors that can be used in the development and evaluation of workplace environmental behaviour change initiatives. These will be referred to as key change factors, or KCFs.

3.1 Part One: Literature Selection

The literature selected for analysis needed to represent the full spectrum of workplace initiatives in order to identify the maximum possible number of factors currently being used in the field of workplace PEB research. In this study a factor is the name given to an antecedent of PEB. For example ‘attitudes’ are a widely recognised factor, as a wide body of literature has demonstrated environmental attitudes are associated with PEB. The literature also needed to represent research from different industries and organisations, to ensure results have wider applicability. Finally, the research needed to span many types of environmental behaviour, as the objective is to develop a tool that can be generally applied to workplace behaviour change, not just focussing on sub-categories such as energy saving or waste management.

3.1.1 Keyword Search

Identifying literature for analysis began with a keyword search using combinations of search terms shown in Table 3.1. Searches were repeated in a number of scientific databases, as shown in Table 3.2.

Table 3.1: Search Term Keywords

Search Terms		
workplace; organisation; organization; organisational; organizational; employees; corporate;		
Environmental	Greening	Corporate greening
Green	Recycling	Waste
Carbon	Carbon dioxide	Greenhouse gas emissions
Pro-environmental behavior	Sustainability	Environmental programmes
Green champions	Carbon champions	Energy champions

Table 3.2: Databases Searched

Databases Searched
Web of Science
Science Direct
Google Scholar
Wiley Online
De Montfort University Library

3.1.2 Reports and General Publications

The second part involved a more general search looking for government, NGO and trade association documents and reports of interest.

3.1.3 In-Reference Search

The in-reference part of the search was a scan through reference lists and reports from the literature already identified. The abstracts of any papers of potential interest were read, and if appropriate selected for inclusion in the study.

3.1.4 Inclusion and Exclusion Criteria

- 1) Studies should be published after 1980. This is following the lead of reviews by McDonald (2014) and Young (2013). The nature of organisational settings and workplace culture has changed significantly over time, and this could potentially impact of external validity.
- 2) The paper had to be examining factors specifically in workplace settings.
- 3) The paper had to be examining the behaviour of individuals not the organisations behaviour.

3.2 Part One: Factor Analysis

The factor analysis was conducted in three main stages.

- Stage One: Establish factor long-list
- Stage Two: Review the literature relating to the long-list and produce the factor short-list
- Stage Three (A): Establish if factors are suitable for real-world application
- Stage Three (B): Consolidate factor list to establish Key Change Factors

3.2.1 Literature Selection

Each publication identified in 3.1 was read with the purpose of finding evidence connecting factors to workplace PEB. This included positive and negative outcomes. A total of 74 publications were included in the final selection. A list of the publications was then compiled, including a brief summary of each paper to aid follow up analysis (Table 4.1)

3.2.2 Factor Long-List

The primary sources for factors were three recent workplace PEB reviews by McDonald, Norton, and Inoue (McDonald, 2014; Norton et al., 2015; Inoue and Alfaro-Barrantes, 2015). Additional factors were added where no existing factors adequately described the parameter in question.

3.2.3 Factor Short-List (Stage Two)

To produce the factor short-list the papers supporting the factor long-list selection were evaluated.

For a factor to progress into stage three, three basic criteria were required:

- 1) There is sufficient quantity of evidence the factor predicts PEB.
- 2) The evidence is of sufficient quality.
- 3) The factor in question could potentially be targeted by organisations wishing to influence PEB among employees. i.e. it is of practical relevance.

Results of stage two analysis are shown in Table 4.3, Table 4.4, and Table 4.5.

3.2.4 Stage Three Analysis

Of the 56 factors on the long-list, 25 were selected for the stage three short-list. Stage three is broken into part A and B.

Part A: Tests if the factor can be applied to a real-world setting by meeting the following criteria:

- 1) Is the factor measurable/ quantifiable?
- 2) Is there evidence interventions to change this factor can be successful?
- 3) Is an intervention targeted at this factor practically possible and typically cost effective in most workplace settings?

Part B: The factor list is further reduced by examining definitions and consolidating factors with similar attributes.

Results from stage three analysis are presented in Table 4.6 and Table 4.7.

3.3 Part Two: Survey

The purpose of the survey was to collect data from a real-world behaviour change programme, to support the data gathered from the factor analysis. This combined insight will be used to develop the behaviour change framework.

There were several constraints to this part of the project which affected the research design. The primary one was access to only a very small sample group. This placed limitations on any statistical analysis. There was also no pre-survey face-to-face contact between the researcher and respondents. A pre-survey meeting was planned, but cancelled at short notice due to unforeseen circumstances. The meeting would have provided an opportunity to encourage greater engagement and possibly increase the sample size. As respondents were approached ‘cold’, it was decided the survey should be short, and not take more than 15 minutes to complete. Finally, delivery of the survey was also time limited. Access to respondents was achieved through a third party, and this caused some delays in reaching subjects.

The survey took place with staff at Birmingham Airport, who are clients of Low Carbon Maintenance and Buildings (LCMB). Birmingham Airport have worked closely with LCMB on a long-term programme of facilities management and energy saving. In November 2014 LCMB launched an Energy Champions programme with the intention of engaging more staff in energy savings objectives of the airport, and to maximise outcomes of the work being done on the technical side of energy saving.

3.3.1 Subjects

The final list of survey respondents consisted of:

- 1) A group of four managers involved in airport sustainability, who were responsible for signing off the Energy Champions project.
- 2) A group of 8 Energy Champions.
- 3) A group of 12 members of regular staff.

Regular staff who were not Energy Champions were put forward by the Energy Champions. Criteria for inclusion were they had not been part of the Energy Champions project, and were not involved in energy, sustainability, or facilities management as part of their job role. Subject demographics are shown in Table 3.3

Table 3.3: Subject Demographics

Subjects	N=24	%	Age	%	Highest Level of Qualification	%
Male		66.7	25 to 34	37.5	GCSE/ O Levels	29.2
Female		33.3	35 to 44	25.0	HND/ BTEC/ Vocational	33.3
			45 to 54	25.0	A Levels	4.2
			55 to 64	12.5	University undergraduate degree	16.7
					University postgraduate degree	8.3
				Other	8.3	

Energy Champ.	N=8	%	Age	%	Highest Level of Qualification	%
Male		75	25 to 34	25.0	GCSE/ O Levels	12.5
Female		25	35 to 44	25.0	HND/ BTEC/ Vocational	37.5
			45 to 54	37.5	A Levels	
			55 to 64	12.5	University undergraduate degree	37.5
					University postgraduate degree	
				Other	12.5	

Managers	N=4	%	Age	%	Highest Level of Qualification	%
Male		75	25 to 34	25.0	GCSE/ O Levels	
Female		25	35 to 44	50.0	HND/ BTEC/ Vocational	50.0
			45 to 54	25.0	A Levels	
			55 to 64		University undergraduate degree	
					University postgraduate degree	50.0

Regular Staff	N=12	%	Age	%	Highest Level of Qualification	%
Male		58	25 to 34	50.0	GCSE/ O Levels	50.0
Female		42	35 to 44	8.4	HND/ BTEC/ Vocational	25.0
			45 to 54	25.0	A Levels	8.3
			55 to 64	16.6	University undergraduate degree	8.3
					University postgraduate degree	
				Other	8.3	

3.3.2 Survey Design

The survey was designed to do three things that collectively help achieve the aims and objectives of this project:

- 1) Gather information on what respondents consider success to mean in the context of an Energy Champions project. This was to aid the development of the framework.
- 2) Identify the activities staff currently engage in which they believe have a positive environmental impact. This was to provide sample data to compare the framework against.
- 3) To see if a relationship exists between protection motivation theory indicators and PEBs. This was to follow up on recommendations for further research that were highlighted in the literature review.

For success measures a mixture of open questions and ranking questions were used. After studying appropriate research there appeared to be a finite number of commonly quoted markers that could be considered as success indicators. The seven most commonly cited were chosen and respondents were asked to rank the three they considered to be the most important. This was preceded by an open question asking what the respondent considers success to mean in the context of the Energy Champions project.

The second part of the survey sort information on the activities respondents engage with at work that they believe have a positive environmental impact. This started with an open question and was followed by specific questions asking about engagement in energy saving, resource saving, and waste management. The final part of the behaviours section asked about engagement in wider reaching environmental activities such as policy and purchasing.

The final part of the survey was designed to measure Protection Motivation Theory indicators. Motivation has been acknowledged in several papers as a factor

influencing workplace PEB that has received limited research (McDonald, 2014; Graves, Sarkis and Zhu, 2013). The questions selected for the survey specifically examined Protection Motivation Theory concepts, which have been proposed as potentially relevant in the understanding of workplace PEB but had to date not been investigated by researchers (McDonald, 2014). The questions for this section were adapted from a previous study looking at protection motivation theory with the adoption of electric vehicles (Bockarjova and Steg, 2014). A full copy of the survey is provided in Appendix One.

Protection Motivation Theory questions assessed five states with three questions for each state. The five states were: **Severity** of the impact from (companies) failing to act on climate change. **Vulnerability** to the effects of climate change personally and for ones family. **Costs** in terms of disadvantages to current way-of-life. **Response efficacy** if companies were to do everything they can to tackle climate change will it make a significant difference. **Self Efficacy** how much impact an individual feels they can make towards climate change through their own actions. Each response was reported using a six-point Likert scale. There were another four questions relating to the dependent variables. **Evaluation** recorded an overall assessment of taking action to address sustainability. **Intention** was a record of a persons intention to take action with their own PEB. **Priority** asked if workplace sustainability should take a higher priority than it currently does. **Policy** explored feelings towards regulation and rewards. Responses for dependent variables also used a six-point Likert scale.

It was decided to administer the survey using an online survey tool. This had the advantage of being easy to manage remotely, and quick for respondents to click through to from e-mail invitations. The survey was initially written using an Excel spreadsheet. Once the question format and wording were satisfactory the survey was programmed into the web survey tool. Survey Monkey was chosen for the project due to ease of use and previous experience by the researcher. See <https://www.surveymonkey.net> for more information.

3.3.3 Pilot Testing

Before the survey was sent out a pilot study was conducted with five respondents who were not members of Birmingham Airport staff. Respondents were asked to give feedback on pre-questionnaire information, clarity/ambiguity of question wording, order of questions, and any general comments. The pilot survey was also used to gauge the time taken to complete the survey. The average time reported on Survey Monkey was 12:50, and therefore met the objective of being less than 15 minutes.

Following feedback from the pilot survey amendments were made to the wording of some questions. All respondents reported experiencing no technical issues and perceived the survey as not taking much time to complete.

3.3.4 Survey Delivery

The researcher did not personally know any of the target respondents and therefore it was important to establish a good line of communication in order to maximise response rates. This was done through a series of e-mails. A list of e-mail addresses for Energy Champions and managers was provided by LCMB. Two versions of the e-mails were sent, one directed at Energy Champions and one for non-Energy Champions. An outline of the e-mail content is provided in Table 3.4

Table 3.4: Survey E-Mail Communication

E-mail Number	Circulation Date	Synopsis
1	28/07/15	<ul style="list-style-type: none"> • Personal introduction including explanation of the researchers relationship with LCMB and the reason for the survey. • Explanation of what will be required, i.e. to complete a 15 minute survey. • Pre-warn the survey will be sent out the following week. • Energy Champions were also asked to provide the names of two non-energy champion colleagues who would be willing to complete the survey.
2	04/08/15	<ul style="list-style-type: none"> • Inform respondents the survey is now live and must be completed by Friday 7th August. • Provide a direct link to the online survey
3	06/08/15	Reminder e-mail encouraging people to complete the survey by the end of Friday 7 th August.
4	07/08/15 AM	<ul style="list-style-type: none"> • Sent reminder e-mail worded to highlight only a small number of surveys are outstanding. • Added an incentive that if the majority of surveys were returned by 6PM a charitable donation would be made. • Advised people a final e-mail would be sent that evening to confirm if the target had been met.
5	07/08/15 PM	Final e-mail sent out thanking everyone for their support and confirming the target response rate was achieved.

3.3.5 Survey Analysis

After the close of the survey data was exported to Microsoft Excel as an .xls file. Data analysis for success indicators and PEBs was conducted using Microsoft Excel. For Protection Motivation Theory results a low number of data-sets limited the scope for statistical tests. Correlations and regression analysis were run to see if the data indicates any predictive power of perceived environmental threats over attitudes to mitigation, however results were to be interpreted with caution. Analysis was conducted using StatPlus for Excel.

4 Results

The results are presented in two sections. The results in section one are from the factor analysis and identify the Key Change Factors (KCFs). Section two reports and analyses data from the survey conducted at Birmingham Airport.

4.1 Factor analysis

Table 4.2 presents the factor long-list. The table is broken up into three groups using the classification as described in the literature review; ‘External’, ‘Interpersonal/Social’, and ‘Intrapersonal’. Within each group are a number of categories within which sit the 56 factors that met the long-list criteria.

Results of the stage two analysis are shown in Table 4.3, Table 4.4, and Table 4.5. Factors that meet the criteria described in section 3.2.3 are indicated with a Y in the column ‘Stage 3’.

Table 4.6 contains the stage three-A analysis, and shows which factors met the qualifying criteria described in 3.2.4. Factors were required to have a positive (Y) result in all three determinants in order to be selected.

Stage three-B was the final part of the analysis and results are shown in Table 4.7. This stage was used to determine which factors work together, and produce the final KCF list.

Table 4.1: Papers Included in Literature Analysis

Author (year)	Title	Summary
Andersson et al (2005)	Enacting Ecological Sustainability in the MNCL. A Test of an Adapted Value-Belief-Norm Framework	Supervisory/ leaders support shown to impact on employees PEB
Austin (1993)	Increasing recycling in office environments: The effects of specific, informative cues	Proximity of prompts influences office recycling rates
Bissing-Olson (2013)	Relationships between daily affect and pro-environmental behavior at work: The moderating role of pro-environmental attitude	Daily affect, pro environmental attitude and daily PEB task completion. Positive effect of attitude on task and proactive behaviour
Blok (2014)	Encouraging sustainability in the workplace: a survey on the PEB of university employees	Theory of Planned Behaviour can explain workplace PEB.
Boiral (2013)	Leading by Example: A Model of Organizational Citizenship Behavior for the Environment	Positive effect of values and perceived behaviour control with relationships to OCBs in managers
Caines (2008)	Smarter Choices: Assessing the Potential to Achieve Traffic Reduction Using 'Soft Measures'	Soft measures including travel planning has the potential to reduce national traffic volume by 11% through relatively low cost interventions.
Cairns (2010)	Understanding successful workplace travel initiatives in the UK	Travel planning reduced commuter driving by 18%
Cantor (2012)	Engagement in Environmental Behaviors Among Supply Chain Management Employees: An Organizational Support Theoretical Perspective	Supervisor support and organisation support shown to influence employee PEB in supply chain management context. Found supervisors play a more visible role than top managers. Also showed training in PEB improves employee perception of organisational support
Carrico (2011)	Motivating energy conservation in the workplace: An evaluation of the use of group-level feedback and peer education	Reducing energy use through group-level feedback and peer educators. Positive effective of collective outcome expectancy
Chen (2002)	An application of bar-code system for reducing construction wastes. Automation in construction	Demonstrates monitoring system that reduces construction waste.
Chen (2014)	Linking Market Orientation and Environmental Performance: The Influence of Environmental Strategy, Employee's Environmental Involvement, and Environmental Product Quality	Results not terribly useful
Chou (2014)	Hotels' environmental policies and employee personal environmental beliefs: Interactions and outcomes	Personal environmental norms shown to positively act on employees environmental behaviours in hotel setting
Christina (2014)	How organisational behaviour and attitudes can impact building energy use in the UK retail environment: A theoretical framework	Organisational and structural context are more influential than personal environmental attitudes and energy management is prone to goal conflicts.
Cordano (2000)	Pollution Reduction Preferences of U.S. Environmental Managers: Applying Ajzen's Theory of Planned Behavior	Positive effects of attitudes, norms, and organizational-level behavior. Negative effect of perceived behavioral control.

Cordano (2004)	Entangled Affiliations and Attitudes: An Analysis of the Influences on Environmental Policy Stakeholders' Behavioral Intentions	Differences among business managers, government regulators and members of pro-environmental groups were shown with respect to attitudes towards property rights, environmental regulation and technology
Cordano (2010)	How do Small and Medium Enterprises Go “Green”? A Study of Environmental Management Programs in the U.S. Wine Industry	Managers within small medium wine firms are responsive to attitudes, norms and pressures from internal stakeholders
Daanmen (2001)	Improving Environmental Behavior In Companies: The Effectiveness Of Tailored Versus Non-tailored Interventions	Tailored messages more effective than non tailored messages in encouraging pro environmental behaviour
Daily (2009)	A Conceptual Model for Organizational Citizenship Behavior Directed Toward the Environment	A framework for voluntary PEB through variables including environmental concern, perceived supervisory support, and perceived corporate social performance.
Davis (2009)	Sustainable attitudes and behaviours amongst a sample of non-academic staff: A case study from an Information Services Department, Griffith University, Brisbane	Using the Theory of Planned Behaviour to study attitudes and beliefs relating to workplace PEB, including recycling.
Dwyer (1993)	Critical-Review Of Behavioral Interventions To Preserve The Environment - Research Since 1980	A review paper showing strategies including commitment, demonstration, and goal setting were most effective in encouraging PEB.
Graves (2013)	How transformational leadership and employee motivation combine to predict employee pro-environmental behaviors in China.	Links between transformational leadership, and employees autonomous and external motivation to perform PEBs
Greaves (2013)	Using the theory of planned behavior to explore environmental behavioral intentions in the workplace	TPB shown to explain 46-61% of behaviour relating to energy use, resource sparing and recycling
Handgraaf (2013)	Public praise vs. private pay: Effects of rewards on energy conservation in the workplace	Manipulation of incentives to reduce energy showed public rewards outperformed private rewards and social rewards outperformed monetary awards.
Holland (2006)	Breaking and creating habits on the working floor: A field-experiment on the power of implementation intentions	Recycling behaviour significantly improved through implementation intention conditions and positioning of recycling facilities.
Homburg (2006)	Explaining pro-environmental behavior with a cognitive theory of stress	Environmental stressors can activate problem solving coping, leading to workplace PEB.
Jones (2012)	Strategies to enhance waste minimization and energy conservation within organizations: a case study from the UK construction sector	Introduced a range of measures to for enhancing environmental management. Found positive results from visual aids and training teams
Kastner (2014)	Implementing web-based interventions to promote energy efficient behaviour at organisations - a multi-level challenge	Positive effects of interventions, but results varied between different HEI's. Some methodological limitations.
Kim (2014)	Multilevel Influences on Voluntary Workplace Green Behavior Individual Differences, Leader Behavior, and Co-worker Advocacy	Tested voluntary workplace green behavior and found conscientiousness and moral reflectiveness were associated plus leader behavior had an indirect relationship with PEB.

Lamm (2013)	Read This Article, but Don't Print It: Organizational Citizenship Behavior Toward the Environment	Workplace environmental Organisational citizenship behavior is influenced by different factors other OCB, and shows perceived organisational support
Lanfranchi (2012)	How green is my firm? Workers' attitudes and behaviors towards job in environmentally-related firms	Adoption of environmental standards in the workplace indirectly impacts of job involvement
Lee (1995)	Factors influencing individual recycling behavior in office settings: A study of office workers in Taiwan	Workplace recycling behaviour can be predicted by home recycling behaviour, but only with like-for-like examples. For example paper recycling at home leads to paper recycling at work, but doesn't mean other items would be recycled.
Lingard (2001)	Improving solid waste reduction and recycling performance using goal setting and feedback	Feedback and goal setting reduced waste to landfill from construction but did not increase recycling rates
Lo (2012)	Energy-Related Behaviors in Office Buildings: A Qualitative Study on Individual and Organisational Determinants	Energy saving and work interests, self-efficacy, and access to facilities were reported as important. Normative and informational interventions received support.
Lo (2013)	Pro-environmental travel behavior among office workers: A qualitative study of individual and organizational determinants	Individual and organisational determinants of pro environmental travel behaviour. Behavioral attitudes, social norms, habits, policy, facilities, and incentives were reported as important. Attitudes and organizational focus were suggested as moderate relationships.
Lo (2014)	Only reasoned action? An inter organizational study of energy-saving behaviors in office buildings	The extent to which habit and attitudes predicts office energy saving depends on context.
Lulfs (2013)	Corporate greening beyond formal programs, initiatives, and systems: A conceptual model for voluntary pro-environmental behavior of employees	A conceptual model with a focus on voluntary behaviours. Highlighted importance of personal norms, but difficulty influencing personal norms in the workplace. Also supervisory support and habits.
Manika (2015)	The Impact of Individual Attitudinal and Organisational Variables on Workplace Environmentally Friendly Behaviours	Environmental attitudes of employees and perceptions of organisational environmentally friendly reputation, on employees PEB. Found influences on PEB depend on behaviour in question.
Marans (1993)	Linking recycling behavior to waste management planning	Only limited abstract available
Marshall (2005)	Exploring individual and institutional drivers of proactive environmentalism in the US Wine industry	Managers, trade associations and regulations all play a significant role in infusing environmental values to employees, and encouraging PEB. Managerial attitudes highlighted as particularly important, but also recognised that all factors were reported as 'critical'
Masurel (2007)	Why SMEs invest in environmental measures: Sustainability evidence from small and medium-sized printing firms	Looked at motivations and attitudes in SMEs and showed improved working conditions and regulation were main motivators for PEBs
Michael (2010)	Executive perceptions of adopting an environmental certification program	Looked at executive attitudes towards certification schemes (i.e. forestry alliance). Benefits were largely financial and based on competitive advantage.
Mir (2008)	Environmental behaviour in Chicago automotive repair micro-enterprises (MEPs)	No evidence of customer demand driving environmental action in in motor repair SME; government intervention and market opportunity strongest incentives for environmental action
Moser (2008)	The effectiveness of soft transport policy measures: A critical assessment and meta-analysis of empirical evidence	Meta-analysis showing poor methodology across all papers in this area, and calling into question positive findings on travel planning.

Murtagh (2013)	Individual energy use and feedback in an office setting: A field trial	Impact of individual feedback on energy use at the work desk. Positive effects of attitudes towards energy saving, environmental identity and biospheric values on behavior. Positive effects of attitudes towards technology and energy saving, and biospheric values on intentions to seek feedback. Positive effects of attitudes towards energy saving on energy consumption.
Norton (2014)	Organisational sustainability policies and employee green behaviour: The mediating role of work climate perceptions	Perceptions of the organisations environmental policy and co-workers orientations to sustainability task related proactive PEB
Oke (2015)	Workplace Waste Recycling Behaviour: A Meta-Analytical Review	Review paper looking at workplace recycling behaviour. Results show complex human behaviour patterns with many influences including situational variables, knowledge, habits, prompts and attitudes.
Osbaldiston (2003)	Promoting internalized motivation for environmentally responsible behavior: A prospective study of environmental goals	Found greater engagement in PEB and behavioural intentions with greater intrinsic motivation.
Paille (2013)	Pro-environmental behavior at work: Construct validity and determinants	Organisational citizenship behaviour introduced as a construct to capture employee PEB. The paper validates the theory and show perceived organisational support and job satisfaction have an indirect effect on organisational citizenship behaviour for the environment (OCBE)
Paille (2013b)	Linking environmental management practices and organizational citizenship behaviour for the environment: a social exchange perspective	Survey of 407 employees from several organisations showed with managerial/supervisory support, decision making freedom and necessary resources, employees will engage in more PEB
Paille (2014)	Antecedents of PEBs at work: The moderating influence of psychological contract breach	Looked at organisational support on PEB via social exchange theory, perceived organisational support had an indirect effect of PEBs due to commitment to the organisation from employees.
Paille (2015)	Corporate Greening, Exchange Process Among Co-workers, and Ethics of Care: An Empirical Study on the Determinants of Pro-environmental Behaviors at Co-workers-Level	Positive effects of commitment to colleagues and intentions to help others. Negative effect of job satisfaction. Positive effect of perceived colleague support mediated by job satisfaction, commitment to colleagues, and intentions to help others.
Ramus (2000)	The Roles of Supervisory Support Behaviors and Environmental Policy in Employee "Eco-initiatives" at Leading-Edge European Companies	Analysed supervisor behaviour to determine which support behaviours related to employee PEBs
Ramus (2007)	Corporate greening through pro-social extrarole behaviours – a conceptual framework for employee motivation	A conceptual framework to show behavioural intent models are highly suitable to analyse motivation in corporate greening.
Robertson (2013)	Greening organizations through leaders' influence on employees' pro-environmental behaviors	Test transformational leadership and leaders PEB against employees pro environmental passion and behavior. Shows positive effects.
Schelly (2011)	Reducing Energy Consumption and Creating a Conservation Culture in Organizations: A Case Study of One Public School District	A comparison of energy use between two public schools showed lower energy in one due to integrated efforts including structural, individual, and cultural changes.
Scherbaum (2008)	Exploring individual-level factors related to employee energy-conservation behaviors at work	Personal norms and environmental worldviews influence workplace PEB and are likely to be more influential than reward based motivation over the longer term.

Schwartz (2010)	Sustainable Energy Practices at Work: Understanding the Role of Workers in Energy Conservation	With the right support workers will take responsibility for sustainable energy practices and for a small cost significant reductions in energy consumption can be achieved.
Siero (1989)	Modification of driving behavior in a large transport organization: A field experiment.	Compared information, task assignment and fuel consumption feedback as methods to modify driving behaviour. Attitudes, social norms, and energy savings were all achieved.
Siero (1996)	Changing Organizational Energy Consumption Behaviour Through Comparative Feedback	Compared performance feedback goals of two groups, one group also being aware of the other groups performance. The group with comparative feedback saved more energy and this took place without changes to attitudes or intentions.
Staats (2000)	A longitudinal study of informational interventions to save energy in an office building	An examination of informational interventions designed to change office occupants behaviour showed positive impact on control of heating and significant cost savings to the organisation. Behaviour change was maintained over time.
Tam (2008)	Waste reduction through incentives: a case study	Incentive funding to staff for lowering waste resulted in 23% less waste production
Taylor (2012)	Evaluating green champions in higher education institutions: Their roles in carbon reduction strategies	Green champions activity and influence in HEIs. Impact dependant on organisational variables, could be improved with clearer job descriptions, increased involvement of senior management and developing a method to audit baseline activity.
Temminck (2013)	Motivating Employees towards Sustainable Behaviour	A significant relationship between perceived organisational support for the environment, organisational commitment, perceived organisational support and OCBE.
Tudor (2007a)	A tale of two locational settings: Is there a link between PEB at work and at home	A comparison of home and work sustainable waste behaviours showed a strong link between the two which were underlined by pro-environmental attitudes and beliefs.
Tudor (2007b)	Linking intended behaviour and actions: A case study of healthcare waste management in the Cornwall NHS	Looked at link between intentions and actions in the context of recycling in Cornwall NHS
Tudor (2007c)	Strategies for improving recycling behaviour within the Cornwall National Health Service	Recycling rates were low due to NHS policies, group norms, combined with individual beliefs around sustainability and waste management.
Tudor (2008)	A Novel Conceptual Framework for Examining Environmental Behavior in Large Organizations. A Case Study of the Cornwall National Health Service (NHS) in the United Kingdom	A conceptual framework showing organisational and individual factors are predictive of sustainable waste behaviour.
Unsworth (2013)	Changing behaviour: increasing the effectiveness of workplace interventions in creating PEB change	Identify psychological conditions to facilitate workplace PEB change. Provide a model with actionable knowledge.
Van Houten (1981)	Reducing elevator energy use: A comparison of posted feedback and reduced elevator convenience	Relative inconvenience of elevator use increased stairs use, whereas information signs showed no effect.
Wehrmeyer (2000)	Activists, pragmatists, technophiles and tree-huggers? Gender differences in employees' environmental attitudes	Woman studied were more likely to be involved in environmental behaviour, and more sceptical than men about the role of technology in tackling environmental problems.
Wu (2013)	A sustainable building promotes pro-environmental behavior: an observational study on food disposal	Recycling behaviour was improved in a building with a focus on sustainability compared to a regular building with the same recycling facilities.
Zhang (2013a)	Determinants and implications of employee electricity saving habit: An empirical study in China	Personal norms, image and perceived harm significantly influence energy saving in Chinese office workers

Zhang (2013b)	Antecedents of employee electricity saving behavior in organizations: An empirical study based on norm activation model	Personal norms positively impact on workplace electricity saving behaviour. Personal norms are positively impacted by awareness of consequences and ascription of responsibility.
Zhang (2014)	Determinants of employee electricity saving: the role of social benefits, personal benefits and organizational electricity saving climate	Employee attitude to electricity saving and perceived behavioural control influence employee intention to save electricity

Table 4.2: Factor Long-List

Category	Factor	
External factors	Regulatory pressure	Satisfying regulations
	Normative pressure	Market opportunities
		Financial Benefits
	Cognitive cultural pressure	Public image
	Attitudes (environment)	Environmental support
	Attitudes (business)	Cost saving
		Strategy
		Improving working conditions
		Perceived organisational support
	Policy	Policy
	Activities (incentives)	Financial
		Non-financial
		Group financial
		Rewards
	Activities (resources)	Training
	Visual Aids	
	Workplace Champions	
	Travel planning	
	Workshops	
	Information	
	Sustainable Building	
Activities (behaviour)	Organisational level behaviour	
	Environmental management practices	
Interpersonal / Social	Leadership style	Transformational
	Activities (feedback)	Feedback
	Activities (support)	Supervisory support
	Environmental attitudes	Environmental stewardship
	Own Employee Green Behaviour	Leader Employee Green Behaviour
	Norms	Social norms
	Behaviour	Goal setting
	Attitudes	Collective self-efficacy
	Perceived colleague support	
Intrapersonal	Personal	Demographics
	Environmental attitudes	Attitudes
		Environmental passion
		Environmental awareness
		Environmental identity
	Behaviour	Attitudes
		Convenience
		Impact awareness
		Perceived behavioural control
		Habits
		Subjective norms
	Norms	Personal norms
		Internal motivation
		Motivation
		Protection motivation theory
		Belief about consequences
	Affect	Positive affect
	Job factors	Task assignment/control
		Affective organisational commitment
		Affective commitment to colleagues
	Job satisfaction	
Intentions	Intentions	
	Goal activation theory	
Personality	Conscientiousness	
	Moral reflectiveness	

Table 4.3: External Factors – Evaluation of Evidence for Stage Three

Category	Factor	Evidence	Comments	Stage 3
Regulatory pressure	Satisfying regulations	Marshall (2005); Masurel (2007); Mir (2008)	There is good supporting evidence, however it is not well suited as a tool to publically engender wider engagement in PEB.	N
Normative pressure	Market opportunities	Marshall (2005); Mir (2008); Michael (2010)	A factor more relevant to the behaviour of more senior decision makers. May not resonate with a wider audience.	N
	Financial Benefits	Michael (2010)	This refers to financial benefits for the organisation. The impact appears to vary depending on the type of business and the employees position within the business.	N
Cognitive cultural pressure	Public image	Mir (2008); Davis (2009)	The influence depends on the position of the employee within the company and therefore would not be considered a key factor.	N
Attitudes (environment)	Environmental support	Marshall (2005); Andersson (2005); Cantor (2012); Lee (1995); Christina (2014); Daily (2009)	The evidence for environmental support is very strong.	Y
Attitudes (business)	Cost saving Strategy	Marshall (2005); Masurel (2007) Tudor (2008)	The level of evidence and understanding is currently insufficient. The study by Chen (2014) claiming strategy as a predictor of PEB had methodological limitations that failed to support the claims.	N
	Improving working conditions	Masurel (2007); Paille (2013b)	Some evidence, but practically difficult to quantify and act upon.	N
	Perceived organisational support	Cantor (2012); Lamm (2013); Paille (2014); Paille (2013a); Paille (2013b); Daily (2009)	Extensively reviewed with consistent results.	Y
Policy Activities (incentives)	Policy	Norton (2014); Ramus (2000)	Results strongly support the benefits of environmental policies.	Y
	Financial	Graves (2013); Tam (2008); Lo (2013); Young (2013)	Specific example from Tam shows can be very effective in certain situations. However, lack of support for wide-scale adoption; Handgraaf (2013) show not as effective as social rewards. Lo (2013) found effect varied between workplaces offering the same reward.	N
	Non-financial	Graves (2013); Manika (2015); Lo (2013)	Graves (2013) showed link between PEB and external motivation but only with transformational leadership. Potential research required to link specific behaviours with specific incentives.	N
	Group financial	Tam (2008); Chen (2002)	Similar findings to individual financial rewards. Chen (2002) results based on a very specific case in the construction sector.	N
Activities (resources)	Rewards	Ramus (2000); Graves (2013); Handgraaf (2013)	Cantor (2012) found no evidence that rewards work, however also found a lack of places offering rewards. Handgraaf interesting comparison between social and monetary rewards. Overall rewards appear to be worth looking at in more detail.	Y
	Training	Cantor (2012); Ramus (2000); Jones (2012); Kastner (2014); Young (2013)	Good evidence that training employees in PEB has a positive impact.	Y
	Visual Aids	Jones (2012); Austin (1993)	Well supported by evidence providing resources meet standards	Y

	Workplace Champions	Taylor (2012); Corrico (2011)	Taylor (2012) highlights areas that need addressing to increase the impact of champions in HEI setting. Corrico (2011) showed stronger impact of interventions when provided by peers.	Y
	Travel planning	Cairns (2008); Cairns (2010)	Moser (2008) showed weaknesses in evidence and showed more research is required in this area.	N
	Workshops	Schwartz (2010)	Evidence of energy reducing behaviour, but only one study to support findings.	N
	Information	Siero (1989); Corrico (2011); Schelly (2011); Staats (2000)	Ramus (2000) found supervisory information dissemination did not predict employee behaviour, but that more work is required in this area. Siero paper good example of a successful intervention in a specific case. On balance not enough evidence to justify information as an independent factor.	Y
Activities (behaviour)	Sustainable Building	Wu (2013)	Not enough comparable evidence.	N
	Organisational level behaviour	Manika (2015); Cordano (2000); Dwyer (1993)	Manika (2015) found results depended on behaviour in question (looked at printing, energy saving and recycling)	N
	Environmental management practices	Lo (2012); Paille (2013b)	Paille (2014) organisational failing to deliver environmental promises will negative impact on employee PEB engagement	N

Table 4.4: Social Factors - Evaluation of Evidence for Stage Three

Category	Factor	Evidence	Comments	Stage 3
Leadership style	Transformational	Graves (2013); Robertson (2013)	Transformation leadership does appear to impact on employee PEB, however it represents a specific approach that may not be appropriate in all organisations.	N
Activities (feedback)	Feedback	Siero (1989); Daamen (2001); Handgraaf (2013); Lingard (2001); Carrico (2011); Young (2013); Schelly (2011); Staats (2010)	Siero (1996) showed impact of comparative feedback increased performance and this continued even after feedback stopped. The area has been widely research and consistently shown to have a positive impact on PEB.	Y
Activities (support)	Supervisory support	Ramus (2000); Cantor (2012); Paille (2013b); Andersson (2005); Blok (2014); Young (2013); Daily (2009); Lulfs (2013)	A number of authors have provided evidence showing a significant positive impact when support is received from superiors.	Y
Environmental attitudes	Environmental stewardship	Marshall (2005); Andersson (2005); Cordano (2010)	Influencing behaviour by leaders good management of resources. More relevant in some industries than other, for example Marshall (2005) was looking at land stewardship in wine production.	N
Own Employee Green Behaviour Norms	Leader Employee Green Behaviour	Robertson (2013); Kim (2014); Blok (2014)	Good supporting evidence that significant benefits can be achieved through a low-cost measure.	Y
	Social norms	Norton (2014); Lo (2012); Siero (1989); Handgraaf (2013); Siero (1996); Kim (2014); Carrico (2011)	Very strong evidence and extensively studied. Norton (2014) highlights there may be a need to distinguish between injunctive and descriptive norms	Y
Behaviour	Goal setting	Lingard (2001); Dwyer (1993)	Surprisingly little research in this area, but potentially an important one. Christina (2014) introduced goal conflict as an issue that can prevent	Y

			workplace PEB.	
	Collective self-efficacy	Corrico (2011); Homburg (2006)	Although the evidence is good, there are a limited number of studies looking specifically at this field. There may be cross-over with other categories.	N
Attitudes	Perceived colleague support	Corrico (2011); Homburg (2006); Paille (2015)	Cross-over with social norms. Homburg (2006) found an affect only under certain conditions.	N

Table 4.5: Intrapersonal Factors - Evaluation of Evidence for Stage Three

Category	Factor	Evidence	Comments	Stage 3
Personal	Demographics	Oke (2015); Wehrmeyer (2000)	In addition to these workplace papers there is a wealth of evidence on demographics and differences in PEB. However, this is not an area that could be subject to intervention or recruitment strategy.	N
Environmental attitudes	Attitudes	Manika (2015); Siero (1989); Cordano (2000); Bissing-Olson (2013); Boiral (2013); Cordano (2004); Greaves (2013); Lulfs (2013); Murtagh (2013); Scherbaum (2008); Temminck (2013)	Although Siero (1996) demonstrated change can take place without attitude change if other drivers (feedback) are present, there is clear evidence attitudes are predictive of engagement in PEB.	Y
	Environmental passion	Robertson (2013)	This factor was only presented in one study and therefore lacks sufficient evidence.	N
	Environmental awareness	Young (2013); Tudor (2008)	Awareness is an area that could be relevant to workplace interventions or may be appropriate to combine with other factors	Y
Behaviour	Environmental identity	Murtagh (2013)	Insufficient evidence to explore further at this stage.	N
	Attitudes	Lo (2013); Murtagh (2013); Tudor (2007b); Tudor (2007c); Van Houten (1981)	A significant amount of evidence supports behaviour attitudes as predictive of PEB.	Y
	Convenience	Van Houten (1981)	The research presented provides a good example of an effective intervention. Unfortunately there is not enough supporting evidence from other workplace environments.	N
	Impact awareness	Lo (2012)	This factor was only referred to in one study.	N
	Perceived behavioural control	Lo (2012); Cordano (2000); Boiral (2013); Greaves (2013); Unsworth (2013); Zhang (2014); Davis (2009)	Many studies used the Theory of Planned Behaviour to explain workplace pro-environmental actions and found an association with perceived behavioural control.	Y
	Habits	Lee (1995); Lo (2012); Christina (2014); Lo (2013); Lo (2014); Lulfs (2013); Tudor (2007a)	Lee showed workplace recycling was predicted from home behaviour. Holland (2006) showed habits could be changed through implementation intention conditions.	Y
	Subjective norms	Cordano (2000); Siero (1996); Greaves (2013); Lo (2013); Murtagh (2013)	Good evidence to consider this factor.	Y

Norms	Personal norms	Robertson (2013); Chou (2014); Zhang (2013a); Tudor (2008); Zhang (2013b)	Personal norms have been shown as predictive in a wide range of studies and a variety of contexts.	Y
	Internal motivation	Graves (2013); Handgraaf (2013); Siero (1996); Unsworth (2013); Zhang (2013a); Osbaldiston (2003)	Recognised as not having received sufficient research by Graves (2013)	Y
	Motivation	Handgraaf (2013); Zhang (2013a); Ramus (2007)	This research adds to those looking at internal motivation and strengthens the case for further examination of motivation as a factor.	Y
	Protection motivation theory	Zhang (2013a)	Self protection mentioned in discussion of Homburg	Y
	Belief about consequences	Davis (2009); Lulfs (2013); Zhang (2013b)	A number of studies have applied the Value-Belief Norm theory to workplace PEB and showed Awareness of Consequences predicts PEB.	Y
Affect	Positive affect	Bissing-Olson (2013)	Insufficient evidence at this stage.	N
	Task assignment/control	Paille (2013b); Siero (1989)	A good paper Siero demonstrates the applicability this factor may have in a real-world application.	Y
	Affective organisational commitment	Lamm (2013)	Current research in this area is limited and insufficient to draw conclusions.	N
	Affective commitment to colleagues	Paille (2015)	Current research in this area is limited and insufficient to draw conclusions.	N
Intentions	Job satisfaction	Paille (2013a)	Current research in this area is limited and insufficient to draw conclusions.	N
	Intentions	Tudor (2007b); Holland (2006); Osbaldiston (2003); Ramus (2007)	It is well documented in general behaviour literature that intention are a pre-requisite to behaviour. However, in this context the objective is to focus on factors that precede intentions.	N
Personality	Goal activation theory	Unsworth (2013)	Current research in this area is limited and insufficient to draw conclusions.	N
	Conscientiousness	Kim (2014)	Current research in this area is limited and insufficient to draw conclusions.	N
	Moral reflectiveness	Kim (2014)	Current research in this area is limited and insufficient to draw conclusions.	N

Table 4.6: Stage Three-A – Are Factors Measurable, Changeable and Practical?

Category	Factor	Measurable?	Changeable?	Practical?	Stage 3B
Attitudes (environment)	Environmental support	Y	Y	Y	Y
	Perceived organisational support	Y	Y	N	N
Policy	Policy	Y	Y	Y	Y
	Rewards	Y	Y	Y	Y
Activities (resources)	Training	Y	Y	Y	Y
	Visual Aids	Y	N	Y	N
	Workplace Champions	Y	Y	Y	Y
	Information	Y	Y	Y	Y
Activities (feedback)	Feedback	Y	Y	Y	Y
Activities (support)	Supervisory support	Y	Y	Y	Y
Employee Green Behaviour	Leader Green Behaviour	Y	Y	Y	Y
Norms	Social norms	Y	Y	N	N
Behaviour	Goal setting	Y	Y	Y	Y
Environmental attitudes	Attitudes	Y	N	N	N
	Environmental awareness	Y	Y	N	N
Behaviour	Attitudes	Y	Y	N	N
	Perceived behavioural control	Y	Y	Y	Y
	Habits	Y	Y	Y	Y
	Subjective norms	Y	Y	Y	Y
Norms	Personal norms	Y	Y	N	N
	Internal motivation	Y	Y	Y	Y
	Motivation	Y	Y	Y	Y
	Protection motivation theory	Y	N	Y	N
	Belief about consequences	Y	Y	N	N
Job factors	Task assignment/control	Y	Y	Y	Y

Table 4.7: Stage Three-B - Consolidating Factors with Overlapping Attributes

Category	Factor	Common Definition	Consolidate As
Attitudes (environment)	Environmental support	The organisation publically communicate pro-environmental messages and take visible pro-environmental actions.	Organisational Leadership
Policy	Policy	The organisation has a sustainability or environmental policy that is supported by top-level management.	Organisational Leadership
	Rewards	Rewards includes any kind of incentive, ranging from acknowledgments by senior staff, to more tangible rewards or financial remuneration.	Motivation
Activities (resources)	Training	Training is defined as an activity delivering information or skills relating to environmental action, that may be based on a specific issue or more general behaviour.	Support
	Workplace Champions	An individual or group of staff not normally involved in sustainability, who promote PEB within the organisation. Often in larger organisations where the champion can help disseminate information to their department.	Support
	Information	Includes a range of measures often including written communication such as e-mails, posters, and literature to promote PEB or specific events.	Support
Activities (feedback)	Feedback	Feedback or recognition for PEBs. Typically from senior staff but also includes colleagues.	Leadership
Activities (support)	Supervisory support	Support from immediate line managers/ supervisors, as opposed to top-level leadership.	Leadership
Own Employee Green Behaviour Behaviour	Leader Employee Green Behaviour	Employees initiate and sustain behaviour they see exhibited by their leaders and managers.	Leadership
	Goal setting	Targets from managers or self-selected which may be environmental and non-environmental goals. Depending on the situation these have been shown to help and hinder engagement in PEB.	Motivation
	Perceived behavioural control	Based on the Theory of Planned Behaviour. The influence and impact an individual believes they can have on a particular outcome.	Beliefs
	Habits	A routine of behaviour that is regularly repeated as part of day-to-day activities.	Beliefs
	Subjective norms	Perception of the behaviour you feel others expect you to perform.	Beliefs
	Internal motivation	Motivation driven by an internal desire as opposed to external reward. Reward may be self-fulfilment from the process itself rather than governed by the outcome.	Motivation
	Motivation	Any driver for acting in a particular way which includes external rewards.	Motivation
Job factors	Task assignment/control	The degree to which the individual believes they have trust and independence to make decisions concerning how their work tasks are completed.	Leadership

4.1.1 Key Change Factors

Stage three-B identified five key change factors (KCFs) which are summarised in Table 4.8. These results also introduce a hierarchical association, where the factors are ranked in order of significance, starting with ‘Organisational Leadership’ as the most significant, down to ‘Beliefs’ as the least significant.

Table 4.8: Hierarchical Factor Selection

Key Change Factors
Organisational Leadership
Leadership
Support
Motivation
Beliefs

Based on an extensive review and analysis of the workplace literature these five KCFs represent the areas where organisations should focus their efforts to increase pro-environmental behaviour (PEB) among employees. Section six discusses how this may manifest itself, and suggests considerations for organisational leaders to make when devising interventions. The following sections provide additional explanations for the identified KCFs.

4.1.2 Organisational Leadership

Through the analysis process a number of organisational factors were removed, principally because they relate more to organisational strategy and top-level decision making, and do not have a short to medium-term impact on employee behaviour. The organisational factors that remained in stage three-B are those most visible to the staff and have been shown to contribute towards a pro-environmental workplace culture. These factors are also relatively easy to implement, unlike some of the factors presented in Table 4.2 which are harder to quantify and influence.

4.1.3 Leadership

The literature review and analysis have both shown the behaviour of leaders, including top-level management and immediate superiors, is highly influential in the PEB of staff. The four principle actions in this factor were the feedback leaders provide to individuals and teams, supervisory support, leadership style, and through the example set by their own behaviour. The analysis showed equal support for all four factors, with the relative influence variable depending on the context.

4.1.4 Support

Support encompasses the activities traditionally associated with campaigns and initiatives designed to call people to action, such as promotional literature, education, and training. Whilst the analysis showed not all support mechanisms are effective, there is considerable backing for a number of measures designed to increase PEB. The studies reviewed showed that the impact of support measures needs designing to reflect the workplace environment, social norms, and be based on a clear outcome objective. The analysis showed the evidence for 'Support' factors to be weaker than that for 'Organisational Leadership' and 'Leadership'. However, analysis also showed a need for support measures in many circumstances, and overall support still came out as a behaviour change predictor.

4.1.5 Motivation

The analysis produced a broad motivation factor consisting of rewards, goal setting, extrinsic and intrinsic motivation. Evidence supporting motivation factors is lacking in most areas and therefore it is not possible to identify the relative merits of the sub-factors. The analysis did show motivation as a variable that can up-regulate or down-regulate PEB, and across the sub-factors the cumulative evidence produced motivation as a KCF.

4.1.6 Beliefs

The analysis showed beliefs have a clear influence on behaviour independent of other factors, but also showed other factors can override beliefs and change behavioural outcomes. Changing beliefs and personal norms in the workplace setting is known to be difficult (Lülfes and Hahn, 2013), and it appears beliefs are more likely to respond to indirect influences of other factors, rather than direct attempts that target beliefs and attitudes. This led the analysis to conclude beliefs should be at the bottom of the key change factor hierarchy.

4.2 Survey Results

4.2.1 Success Indicators

Energy Champions and Managers involved in the Energy Champions project were asked to: *Identify from the list below the three factors you consider to be the most important indicators of success when evaluating the Birmingham Airport Energy Champions programme.*

The options were:

- To increase the number of staff engaged in PEB in the workplace.
- To make financial savings
- To help achieve relevant accreditation (for example, ISO:9001/14001)
- To reduce the carbon emissions of Birmingham Airport
- To achieve corporate social responsibility objectives
- To help meet the organisations statutory obligations and responsibilities for sustainability
- Building relationships between staff across departments

*Note: With multi-option responses question order was randomly changed for each survey to avoid bias.

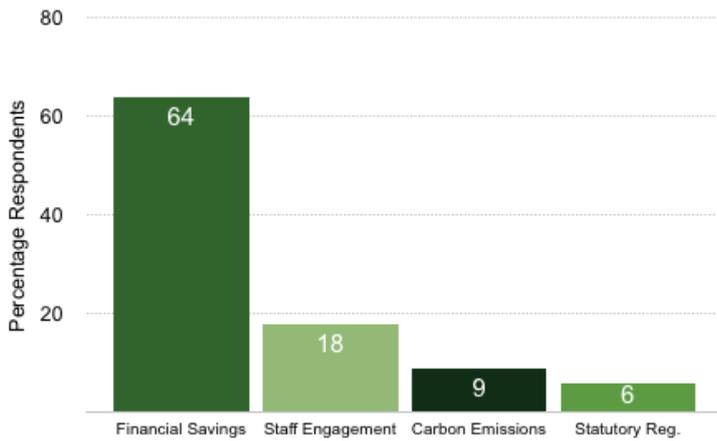


Figure 4.1: First Choice Responses (%)

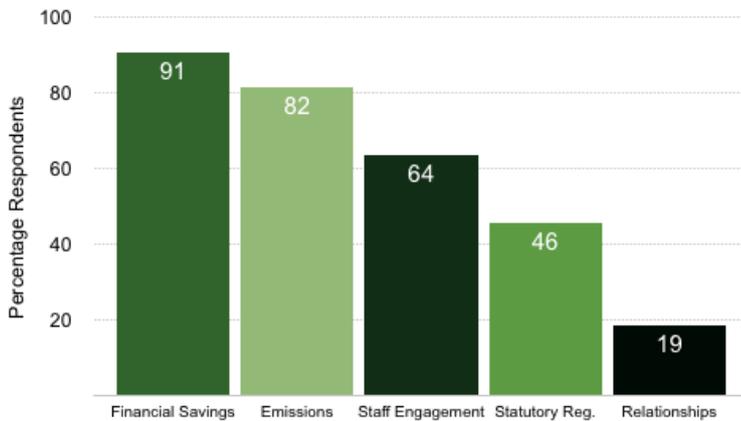


Figure 4.2: Response Appeared in the Top Three Choice (% Respondents)

In addition to the ranking question, respondents were also asked: *What would you consider success to mean in the context of the Energy Champion project as a whole?*

This question was only asked of the Energy Champions and managers. Of the 11 responses to the question, nine used the words *saving* or *reduction*. Costs were only explicitly mentioned in one case. This contrasts with the preceding question financial savings were by far the most popular choice (Figure 4.1). In the open responses the term *energy saving* was used by six respondents, but energy saving was not an option when respondents had to select their top three.

Sample Responses to the question ‘What would you consider success to mean in the context of the Energy Champions project?’

Respondent Three (manager):

‘Continued reduction in consumption [of energy], delivered by ideas within Birmingham Airport from either their [Energy Champion] observations and experience or their specialist / technical knowledge.’

Respondent Seven (Energy Champion):

‘Implementation of energy saving concepts and measurable savings’

4.2.2 Pro-Environmental Behaviours

The second section of the survey looked at PEBs respondents engage with in the workplace. Three basic categories were examined; energy saving, resource saving, and waste management. Respondents were asked how often they engage in each behaviour using a scale from 0 = *Never* to 5 = *Always*.

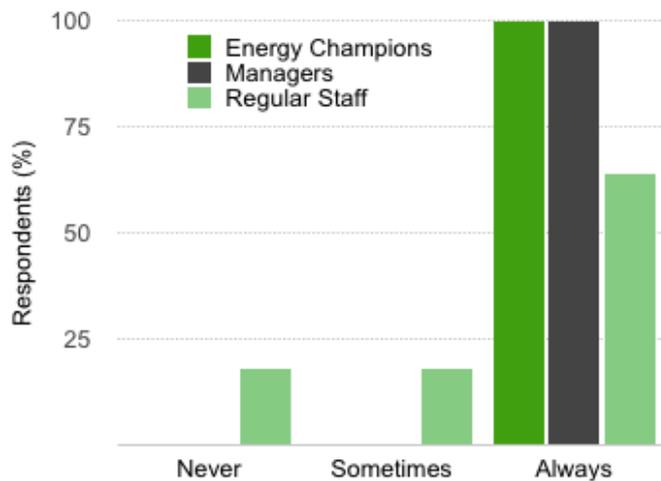


Figure 4.3: Engagement in Energy Saving Behaviours



Figure 4.4: Engagement in Resource Saving Behaviours

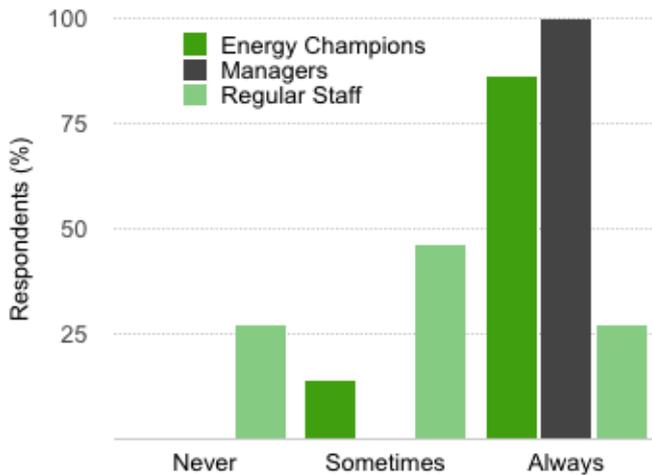


Figure 4.5: Engagement in Sustainable Waste Management

As expected, Energy Champions and managers had a higher proportion of people *always* engaging in the PEB. However, even among regular staff engagement levels were generally good. The management group scored 100 per cent on all three measures, out-performing the Energy Champions.

The staff were also asked the open question *Describe any activities you engage with at work, that you consider to have positive environmental impact for the organisation or in the wider context.*

The 22 responses provide an insight into activities the respondents are engaged in, with actions ranging from; ‘I switch off unnecessary lights’ to ‘trailing new LED fittings within the Engineering Base and on the Airfield’. Most responses related to energy savings, and were based on turning off unused lighting and equipment.

4.2.3 Protection Motivation Theory

Respondents were asked a series of questions relating to Protection Motivation Theory (PMT) constructs (See Appendix One). All questions were responded to using a six-point Likert scale (0-5). Raw data is presented in Table 4.9.

Table 4.9: Protection Motivation Theory Raw Data

Respondent	Independent Variables				Dependent Variables				
	Severity	Vulnerability	Costs	Response Efficacy	Self Efficacy	Evaluation	Intention	Priority	Policy
1	4.00	5.00	4.00	4.00	4.67	5.00	5.00	5.00	5.00
2	4.67	5.00	4.33	4.00	4.67	4.00	4.50	5.00	4.33
3	2.33	3.67	2.00	4.00	2.67	4.00	4.00	2.00	3.33
4	3.67	4.00	3.67	4.00	3.67	5.00	5.00	5.00	2.67
5	5.00	5.00	2.33	3.33	4.33	4.00	4.00	5.00	5.00
6	3.67	4.00	4.33	4.00	3.67	4.00	5.00	5.00	4.33
7	4.00	4.00	4.33	4.00	3.33	5.00	5.00	4.00	3.67
8	5.00	4.33	3.67	4.67	3.00	5.00	5.00	5.00	5.00
9	4.00	5.00	3.33	3.67	3.33	4.00	4.50	4.00	4.33
10	3.33	3.33	2.33	3.00	2.33	4.00	4.00	3.00	2.00
11	1.33	2.00	1.50	2.00	2.33	2.00	1.50	3.00	3.33
12	3.00	2.50	3.67	3.00	1.00	5.00	2.50	5.00	5.00
13	5.00	5.00	2.67	5.00	1.00	4.00	4.00	5.00	5.00
14	3.00	3.00	2.67	3.00	2.33	4.00	3.00	3.00	3.33
15	3.00	3.00	3.00	1.67	2.33	4.00	3.00	4.00	3.33
16	3.67	4.00	4.00	3.00	4.67	4.00	5.00	5.00	5.00
17	3.00	2.33	3.33	3.00	1.00	2.00	2.50	2.00	1.33
18	5.00	5.00	3.33	3.67	4.00	5.00	5.00	4.00	2.67
19	5.00	4.33	3.00	3.00	3.00	4.00	2.50	3.00	2.67
20	4.00	4.00	2.67	4.00	1.67	4.00	3.50	5.00	5.00
21	4.67	5.00	3.67	5.00	3.00	5.00	5.00	5.00	4.00
22	3.33	3.00	1.67	3.33	2.67	4.00	3.50	4.00	3.67
Mean	3.80	3.93	3.16	3.56	2.94	4.14	3.95	4.14	3.82
SD	0.98	0.97	0.85	0.84	1.15	0.83	1.07	1.04	1.09

PMT results were first tested using Pearson Linear Correlation. Table 4.10 shows the null hypothesis was rejected in 14 of the 20 cases, with the data reporting a number of

strong positive correlations (as indicated by an R value over 0.5). There is very little association shown between policy and the dependent variables, or between any of the independent variables and self efficacy. However, as there is a number of associations between the variables a regression analysis was also completed.

Table 4.10: Correlations Between Dependent and Independent Variables

		Severity	Vulnerability	Costs	Response Efficacy	Self Efficacy	Evaluation	Intention	Priority	Policy
Severity	R	1.								
	p-value									
	H0 (5%)									
Vulnerability	R	0.84679	1.							
	p-value	6.72477E-7								
	H0 (5%)	<i>rejected</i>								
Costs	R	0.42123	0.40627	1.						
	p-value	0.0509	0.06063							
	H0 (5%)	<i>accepted</i>	<i>accepted</i>							
Response Efficacy	R	0.6114	0.688	0.36314	1.					
	p-value	0.0025	0.0004	0.09669						
	H0 (5%)	<i>rejected</i>	<i>rejected</i>	<i>accepted</i>						
Self Efficacy	R	0.35904	0.58829	0.42108	0.14085	1.				
	p-value	0.1008	0.00398	0.05099	0.53182					
	H0 (5%)	<i>accepted</i>	<i>rejected</i>	<i>accepted</i>	<i>accepted</i>					
Evaluation	R	0.53995	0.55269	0.48375	0.52152	0.35583	1.			
	p-value	0.00949	0.00764	0.02254	0.0128	0.1041				
	H0 (5%)	<i>rejected</i>	<i>rejected</i>	<i>rejected</i>	<i>rejected</i>	<i>accepted</i>				
Intention	R	0.56004	0.73717	0.59914	0.6859	0.64857	0.67591	1.		
	p-value	0.00672	0.00009	0.00321	0.00043	0.00109	0.00055			
	H0 (5%)	<i>rejected</i>	<i>rejected</i>	<i>rejected</i>	<i>rejected</i>	<i>rejected</i>	<i>rejected</i>			
Priority	R	0.54331	0.53898	0.50594	0.45565	0.3656	0.58334	0.5432	1.	
	p-value	0.00897	0.00965	0.01629	0.03308	0.09428	0.00438	0.00899		
	H0 (5%)	<i>rejected</i>	<i>rejected</i>	<i>rejected</i>	<i>rejected</i>	<i>accepted</i>	<i>rejected</i>	<i>rejected</i>		
Policy	R	0.32104	0.42533	0.23809	0.38252	0.22611	0.37724	0.31235	0.76557	1.
	p-value	0.14517	0.04845	0.28598	0.07892	0.31161	0.0835	0.157	0.00003	
	H0 (5%)	<i>accepted</i>	<i>rejected</i>	<i>accepted</i>	<i>accepted</i>	<i>accepted</i>	<i>accepted</i>	<i>accepted</i>	<i>rejected</i>	

The regression analysis tested to what extent the independent variables predicted the four indicators for taking action. A multiple regression analysis was used aggregating the independent variables. Four sets of results are reported (Table 4.11 to Table 4.14)

The results presented in Table 4.11 show the variability in the regression model is high, and therefore not significant ($p > .05$). Coefficient values for all five independent variables are also not significant. Therefore Protection Motivation Theory concepts do not predict opinions on the need to address sustainability.

Table 4.11: Regression of Evaluation on PMT Variables

Evaluation	
R	0.65396
R Square	0.42766
Adjusted R Square	0.24881
S	0.72245
Total number of observations	22
Evaluation = 1.4080 + 0.2033 * Severity - 0.0316 * Vulnerability + 0.2207 * Costs + 0.2956 * Response Efficacy + 0.1121 * Self Efficacy	

ANOVA					
	d.f.	SS	MS	F	p-level
Regression	5.	6.24	1.248	2.39112	0.08423
Residual	16.	8.35091	0.52193		
Total	21.	14.59091			

	Coefficients	Standard Error	LCL	UCL	t Stat	p-level	H0 (5%) rejected?
Intercept	1.40803	0.8095	-0.30802	3.12409	1.73939	0.10116	No
Severity	0.20333	0.33589	-0.50872	0.91539	0.60536	0.55343	No
Vulnerability	-0.03156	0.4713	-1.03067	0.96756	-0.06695	0.94745	No
Costs	0.22067	0.22818	-0.26305	0.70438	0.96709	0.34789	No
Response Efficacy	0.29557	0.30599	-0.3531	0.94424	0.96594	0.34845	No
Self Efficacy	0.11213	0.22044	-0.35519	0.57945	0.50867	0.61793	No

The results presented in Table 4.12 show the variability in the regression model to be significant ($p < .001$). Coefficient values are significant for Response Efficacy ($p < .001$) and Self Efficacy ($p < .05$) but not significant for the remaining variables. Overall Protection Motivation Theory concepts explain a significant amount of the variance in intentions to conduct PEB (R^2 0.81, $R^2_{Adjusted}$ 0.75).

Table 4.12: Regression of Intention on PMT Variables

Intention	
R	0.90102
R Square	0.81184
Adjusted R Square	0.75304
S	0.53076
Total number of observations	22
Intention = -0.5869 - 0.1218 * Severity + 0.1064 * Vulnerability + 0.2681 * Costs + 0.6942 * Response Efficacy + 0.4311 * Self Efficacy	

ANOVA					
	d.f.	SS	MS	F	p-level
Regression	5.	19.44731	3.88946	13.807	0.00003
Residual	16.	4.50724	0.2817		
Total	21.	23.95455			

	Coefficients	Standard Error	LCL	UCL	t Stat	p-level	H0 (5%) rejected?
Intercept	-0.58689	0.59471	-1.84762	0.67383	-0.98686	0.3384	No
Severity	-0.12175	0.24677	-0.64487	0.40137	-0.49338	0.62845	No
Vulnerability	0.1064	0.34625	-0.62761	0.84041	0.3073	0.76258	No
Costs	0.26813	0.16763	-0.08723	0.6235	1.59952	0.12926	No
Response Efficacy	0.69424	0.2248	0.21768	1.17079	3.08825	0.00705	Yes
Self Efficacy	0.43109	0.16195	0.08777	0.77441	2.66184	0.01705	Yes

The results presented in Table 4.13 show the variability in the regression model is high, and therefore not significant ($p > .05$). Coefficient values for all five independent variables are also not significant. Therefore Protection Motivation Theory concepts do not predict the level of priority given to given to sustainability issues.

Table 4.13: Regression of Priority on PMT Variables

Priority							
R	0.64282						
R Square	0.41322						
Adjusted R Square	0.22985						
S	0.91022						
Total number of observations	22						
Priority = 0.8813 + 0.2918 * Severity + 0.0101 * Vulnerability + 0.3362 * Costs + 0.2024 * Response Efficacy + 0.1099 * Self Efficacy							
ANOVA							
	d.f.	SS	MS	F	p-level		
Regression	5.	9.33495	1.86699	2.25347	0.09887		
Residual	16.	13.25596	0.8285				
Total	21.	22.59091					
	Coefficients	Standard Error	LCL	UCL	t Stat	p-level	H0 (5%) rejected?
Intercept	0.88126	1.01989	-1.28081	3.04333	0.86407	0.40032	No
Severity	0.29177	0.42319	-0.60536	1.18889	0.68944	0.50043	No
Vulnerability	0.01012	0.59379	-1.24867	1.26891	0.01704	0.98661	No
Costs	0.33618	0.28748	-0.27326	0.94562	1.16939	0.25937	No
Response Efficacy	0.20237	0.38552	-0.61489	1.01964	0.52494	0.60682	No
Self Efficacy	0.10993	0.27774	-0.47885	0.69871	0.39579	0.69749	No

The results presented in Table 4.14 show the variability in the regression model is high, and therefore not significant ($p > .05$). Coefficient values for all five independent variables are also not significant. Therefore Protection Motivation Theory concepts do not predict opinions on workplace environmental policy and regulation.

Table 4.14: Regression of Policy on PMT Variables

Policy							
R	0.45704						
R Square	0.20888						
Adjusted R Square	-0.03834						
S	1.11293						
Total number of observations	22						
Policy = 1.6016 - 0.2251 * Severity + 0.5508 * Vulnerability + 0.1197 * Costs + 0.1862 * Response Efficacy - 0.0455 * Self Efficacy							
ANOVA							
	d.f.	SS	MS	F	p-level		
Regression	5.	5.23267	1.04653	0.84492	0.53769		
Residual	16.	19.81784	1.23861				
Total	21.	25.05051					
	Coefficients	Standard Error	LCL	UCL	t Stat	p-level	H0 (5%) rejected?
Intercept	1.6016	1.24703	-1.04198	4.24519	1.28434	0.21731	No
Severity	-0.22511	0.51744	-1.32203	0.87182	-0.43504	0.66934	No
Vulnerability	0.55078	0.72604	-0.98835	2.08991	0.75861	0.45911	No
Costs	0.11968	0.35151	-0.62548	0.86484	0.34047	0.73793	No
Response Efficacy	0.18617	0.47138	-0.81311	1.18544	0.39494	0.6981	No
Self Efficacy	-0.04553	0.33959	-0.76544	0.67437	-0.13408	0.89501	No

Overall Protection Motivation Theory did not predict the outcome indicators used in the research, with the exception of Intention where a strong significant relationship was observed. However, interpretation of these results needs to consider the small sample size.

4.3 Results Summary

The results of the factor analysis are five ‘key change factors’ that are of direct relevance to workplace PEB initiatives. The factors are hierarchical, with the most influential factor presented at the top of the list. The discussion considers the merits of the key change factors and the significance to workplace PEB change programmes.

The survey wanted to establish what success was in the context of the Birmingham Airport Energy Champions programme. The results found ‘savings’ and ‘financial savings’ were the main marker of success to a clear majority of staff. The discussion looks at what can be learnt from this and examine any contextual factors.

As part of the survey respondents were also asked about the PEB they personally engage with. Staff involved with the energy champions project engaged in workplace PEB more frequently than regular staff, but engagement was high in all groups. These results are considered in the discussion, and helped to inform the framework shown in section five.

Data was also collected on Protection Motivation Theory. Statistical analysis is required to interpret relationships between predictors and outcomes, but a low number of data-sets made this difficult. The value of the information collected is considered in the discussion.

5 Pro-Environmental Behaviour Change Framework

Results from the factor analysis and survey results were used to develop a framework for pro-environmental behaviour change (Figure 5.1). The framework is based around the five Key Change Factors (KCFs) identified in section 4.1.1. The KCFs are hierarchical in nature and begin in the top left of the model with ‘Organisational Leadership’. In the discussion the intermediate steps that link the KCFs together are considered. ‘Leadership’ and ‘Support’ follows on from organisational leadership and collectively influence the final two KCF’s, ‘Motivation’ and ‘Beliefs’. The discussion looks at how the framework can be used to develop workplace PEB initiatives.

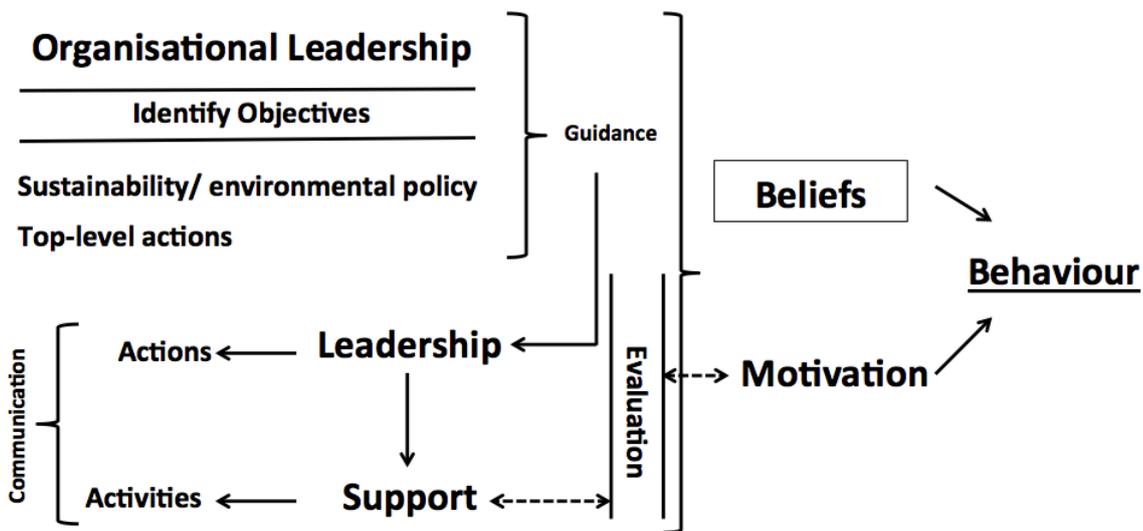


Figure 5.1: Framework for Delivering Workplace PEB Change

6 Discussion

6.1 Introduction

People are integral to the causes of climate change, and to subsequent mitigation and adaptation (Clayton et al., 2015). This discussion considers how peoples behaviour can be influenced in an environmentally positive way within the workplace. Results from the previously presented research are discussed with a view to determining what they mean in the context of interventions to promote pro-environmental behaviour (PEB). The discussion starts by looking at outcomes of the factor analysis, before considering results of the survey. The final section looks at the framework that was developed as a result of the research, and how this can be applied by practitioners working in the field.

6.1.1 Workplace Environmental Behaviour Research

Our examination of the literature showed workplace environmental behaviour research is still in its infancy when compared to citizen environmental behaviour research. Numerous authors have highlighted this and called for more work to be done in areas including the influence of organisational structure, goal setting, habits, and contextual moderators (Young et al., 2013; Robertson and Barling, 2013; Unsworth, Dmitrieva and Adriasola, 2013; Lo et al., 2014). However, whilst this review also recognises these deficits, the area this review believes is most in need of further understanding is how academic constructs can be applied most effectively to real-world settings. Companies are increasingly eager to be pro-active in encouraging PEB, but there is limited guidance available on the most effective way to go about this. As summed up in a report by the Scottish Government, a lot of information is based on opinion, with little evidence of what works and why. There is also no agreement of what constitutes success, or even how to determine what success looks like (Cox et al., 2012).

The claims made in this report, of the need for more evidence-based-practice are supported by practitioners in the field. Low Carbon Maintenance and Buildings

(LCMB) run behaviour change programmes in large organisations including the NHS and Birmingham Airport. LCMB informed this review of the industry need for better benchmarking, evidence-based practice, and mechanisms for determining success criteria.

This research has taken a pragmatic look at the current literature, asked how well it meets the needs of industry practitioners, and if it can be interpreted in a way that is more meaningful to workplaces delivering interventions. The work published in this field to date has mainly focussed on specific interventions or broad theoretical models (Norton et al., 2015). This research is the first, we believe, to analyse and consolidate the current knowledge base into a format that can be used in the field, and our research aim was to develop a framework that would make this accessible.

To achieve our aim and objectives the research was broken into three distinct elements:

1. A review of the workplace environmental behaviour literature.
2. Analysis of selected workplace environmental literature.
3. A survey conducted at Birmingham Airport

6.2 Factor Analysis

A number of theoretical models have previously been produced, but the aims have been based on improving understanding of workplace behaviour (Young et al., 2013; McDonald, 2014; Norton et al., 2015). The aim for this project was *'To develop a framework that can be used to deliver and evaluate workplace pro-environmental behaviour change initiatives'* and was very different to anything that had been published previously. To achieve this the factor analysis had to capture as broad a range of factors as possible, but also be able to summarise these in a way that could be applied practically.

6.2.1 Factor Analysis Methodology

Publications considered in the literature review typically categorised behavioural antecedents (referred to as ‘change factors’ or ‘factors’ in this discussion) in broad groups that helped to explain their role in subsequent PEB. From this format it was not possible to determine the relative influence of the factors on behaviour, as there is nothing to indicate the magnitude of their affect. This review therefore had to develop a new way of analysing the data that would meet the objectives of the project and establish which were the Key Change Factors (KCFs) governing outcomes of workplace PEB initiatives.

6.2.2 Stage One

A three stage process was developed. Stage one collected a long-list of the relevant papers in the field (Table 4.1), and subsequently documented the change factors that were employed in each study. This approach proved to be an effective method, and a list of 56 change factors were identified (Table 4.2).

6.2.3 Stage Two

The second stage was to read the 74 papers relating to the 56 change factors in order to identify those eligible for consideration. This was the most lengthy part of the process, and the hardest to apply a consistent and objective selection criteria to, despite working to a pre-defined structure (3.2.3). This was due to the wide range of methodologies applied in different studies, the use of subtly different definitions for factors, and the amount of research in an area not being proportional to the importance of the change factor. Knowledge from the literature review was beneficial here, however subsequent work should look to tighten up the selection criteria for this stage of the process.

6.2.4 Stage Three (A)

The third stage differentiated the analysis from any previous work by applying three criteria to assess real-world application. Based on feedback from LCMB and the literature review the factors had to be measurable/ quantifiable, have evidence that they

can be changed through interventions, and be practical and cost effective to deliver in the workplace. All three criteria were required to be met for the factor to be considered in the next stage. The most surprising outcome was that all change factors were shown to be measurable, as defined by precedent from previous research. This was unexpected as one of the problems shown in workplace programmes is a lack of evaluation (Cox et al., 2012). There may be a number of other explanations for a lack of evaluation, including poor awareness of evaluation techniques, lack of resources, or a lack on know-how. To date no research has been conducted to identify why there is a lack of evaluation being conducted in workplace behaviour change programmes, and this would be a useful topic for future investigations.

On the second criteria, *is there evidence the situation is changeable*, a number of factors did not make the criteria. The third test looked at practicality and cost of delivering interventions, and it was on this criteria the most factors failed. From the long-list of 56, a total of 16 factors remained at the end of this stage.

6.2.5 Stage Three (B)

The final stage of the process consolidated the remaining 16 factors into the key change factors. The 16 factors were grouped based on their area of influence and five distinct key change factors emerged. From the knowledge accumulated from the literature review, factor analysis and survey it was then possible to arrange the factors in order of influence and the final outcome is presented in 4.1.1.

6.2.6 Final Five Key Change Factors

1. Organisational Leadership was shown in the literature review and subsequent factor analysis as having the greatest influence over employee PEB. This is achieved by influencing behaviour both through guidance to leaders and their subsequent actions, and through an indirect influence of employees beliefs.

2. The second most influential determinant are ‘Leaders’, which encompasses supervisors, managers, feedback, and how an employees work stream is managed. In many contexts incorporating leaders strengthened the predictive power of behavioural outcomes.
3. ‘Support’ was the third outcome of the factor analysis, and refers to a wide-range of measures often associated with behaviour change. Many issues came to light through looking at ‘support’ which also highlighted the challenge of addressing the call for more evidence of ‘what works’ with behavioural interventions.
4. ‘Motivation’ contains moderators of behaviour that if used correctly can increase employee engagement and maximise outcomes. Like Support, Motivation is also notable for lacking in quality evidence to base actions upon. Context plays a significant role, and although it appears a blanket suite of measures can not be rolled out universally, certain interventions clearly have significant benefits in the right circumstances. Support and Motivation therefore need careful consideration and evaluation in order for interventions to be effective.
5. The most surprising of the analysis results was the role of ‘Beliefs’, the final KCF. Of the final KCFs beliefs have the lowest power to predict workplace PEB. In contrast to the published literature this is surprising, as more work has been published around beliefs and workplace PEB, than any of the other factors (Young et al., 2013). This result, it could be argued, shows the limitations of the research in this field to date, and why this project was necessary.

6.2.7 Strengths and Limitations of the Key Change Factor Analysis

As far as the author is aware, this report is the first to identify KCFs for workplace PEB interventions. This required the development of a new methodology which successfully produced a hierarchical list of five KCFs. Inevitably for a new technique there are lessons to learn for future analysis of this kind. Most significant is the need to refine criteria for each stage of the process to ensure objectivity.

There are a number of challenges with this, most notably the lack of quality research in the field. As highlighted in the literature review, there are many limitations with the current literature both in terms of the quantity of publications in many areas, and the quality of research that has been produced. For example, evidence supporting the selected KCFs is variable, with ‘organisational leadership’ and ‘leadership’ based on clearer research outcomes than ‘support’ and ‘motivation’. However, the factor analysis conducted for this research is only as good as the literature produced, and therefore it is recommended that the KCF analysis should be repeated periodically as new research is published.

6.3 Survey

The emphasis on real-world evidence-based application of this project deemed it necessary to combine the theoretical study with capturing data from the staff at an organisation involved with delivering environmental behaviour change initiatives. Birmingham Airport were chosen for the study due to our links with LCMB, for whom they are clients. As an organisation already partaking in energy saving and sustainability measures, Birmingham Airport is in a different situation to many workplaces. However, this provided an opportunity to gather information from staff directly involved with energy saving (through the Energy Champions programme) and contrast their attitudes and behaviour to staff not directly involved.

The scope of the survey was always going to be limited in terms of external reach as there was access to only a small pool of subjects. However, the objective relating to this part of the project was to obtain an insight into success indicators, behaviour, and motivation that would help inform the development of the behaviour change framework. This was achieved by keeping the survey focussed on just those three key elements. Our target response rate for the survey was 28, based on the number of Energy Champions at the time of the study (12), an equal number of non-Energy Champions, and four managers involved with the project. Twenty two fully completed surveys were submitted, and two partially completed. Two respondents were known to be on leave,

and two people failed to respond. This high response rate we believe was due to establishing a good communication stream and personalising e-mails where possible.

6.3.1 Success Indicators

One of the questions asked by LCMB, and repeated in the literature (Cox et al., 2012), was how do you define success in a workplace behaviour change initiative. As part of the survey we put this question to the Energy Champions and managers, and showed very clear results. Financial savings were listed as a marker of success by 91 per cent of respondents, with 64 per cent saying it is the most important success marker. This relates to the second most popular choice of reducing emissions, which 82 per cent selected, but only 18 per cent designated as their first choice. In the open question on success comments were dominated by references to savings, and the impression is the terms financial savings and energy saving are considered synonymous with one another.

Birmingham Airport has been going through a restructure over recent years. Financial pressure has been high, and there have been a number of job redundancies in the last two years, making staff aware of the need to make better use of resources. When reflecting on the objectives of the organisation and the widespread awareness of financial pressures, it is perhaps not surprising ‘savings’ was the dominant response. Whilst this process would need repeating in different organisations to gain a better understanding of how success is influenced by organisational circumstances, it supports the need for objectives (success indicators) to be identified by the organisation in order to convey the message to management and staff. From the workplace PEB literature there is no agreed definition of success with behaviour change initiatives, and it is difficult to see how this could be developed due to the uniqueness of every organisation. For this reason the behaviour change framework developed in this research includes ‘Identify Objectives’ as part of the model at Organisational Leadership level (Figure 5.1). ‘Success’ may need to be determined on a project-by-project basis, but as shown in this survey, can be easily quantified.

6.3.2 Engagement in Pro-Environmental Behaviour

The results on PEB within the Birmingham Airport staff showed a high level of engagement in behaviours including energy saving, resource saving, and waste management. Energy saving showed the highest engagement, possibly due to emphasis put on this by the airport. As anticipated, engagement was higher with the Energy Champions and Managers compared to regular staff.

An airport provides an interesting case study, not least because the core business is considered as a high carbon impact activity (Gössling and Peeters, 2007), and therefore relative energy saving from individual initiatives may be perceived to have a smaller impact. Because of the small scale of this research it is difficult to draw firm conclusions, but the results closely align with the behaviour change framework that was produced. Organisational leadership on energy saving has been an on-going message at the airport for several years, and is reinforced by managers and supervisors. For example one of the managers commented *'[I ensure] my team are engaged, enthused and aware of energy saving in the workplace'*. A number of support interventions are run, including the Energy Champions project previously described, and a range of motivators are employed, including goal setting and social rewards.

6.3.3 Protection Motivation Theory

Our survey investigated Protection Motivation Theory (PMT) in response to previous research showing PMT as a predictor for electric car adaptation (Bockarjova and Steg, 2014). Whilst there are grounds to justify studying links between PMT and workplace PEB (McDonald, 2014), the number of respondents to this survey was insufficient to give significant insight into the behavioural factor. For this reason interpretation of results should be considered as provisional, and would require further analysis to draw conclusions. Response Efficacy did show a stronger correlation with the dependent variables than Self Efficacy, which may relate to the business context and the role of the individual being relatively small compared to the environmental impact of fuel combustion from flights. Response efficacy and self efficacy predicted 'Intention to act (environmentally)' suggesting when people believe something can be done they are

more likely to do it. However, other determinants were not statistically significant. Based on these results further analysis would be of interest, but based on the wider finding from this research there are areas that would be considered of higher priority.

6.3.4 Survey Summary

The literature review conducted for this research showed the impact of context on attitudes and behaviour of staff, and it is recognised results from the survey provide only a limited view of a very specific set of circumstances. Nevertheless the survey provided a useful insight into the link with the theoretical work and helped to inform the behaviour change framework.

6.4 Behaviour Change Framework

The overall aim of this project was to develop a framework that can facilitate delivery of workplace behaviour change programmes. This was achieved through a combination of reviewing the current workplace PEB literature, reanalysing literature to identify key change factors, and conducting a survey that helped inform interactions between key change factors in the framework.

The finished model (Figure 5.1) provides a unique insight into how key change factors work together to influence workplace PEB, and identifies mediators of behaviour. The model also includes mechanisms to strengthen the effectiveness of outcomes. For example, the survey recognised the importance of defining success and ‘Identify Objectives’ was added to the model as a requirement of the organisational leadership. The other significant addition to the model is the addition of evaluation. Both ‘Support’ (interventions to promote the update of PEBs) and ‘Motivation’, were found to be particularly sensitive to context. Whilst leaders can use experience to guide initial planning stages, evaluation should be an integral part of any workplace programme looking to maximise efficiency and outcomes. The framework also reflects the place of beliefs within an applied model. There was a relatively strong field of research in this area showing that beliefs can work independently of the other KCFs identified, but can

also be influenced by them. Beliefs are therefore treated more as an indirect influence within the model, which will be positively enforced if the other conditions are met.

6.5 Summary

Whilst this project aspired to produce an ‘off-the-shelf’ guide for delivery of workplace PEB interventions, findings are the current state of knowledge in this research area is a long way from making this possible. However, what has been demonstrated is a way to improve current practice based on existing knowledge. The behaviour change framework that has been developed takes what is established in the literature and provides a model that can be adapted based on the unique context of each workplace environment. Through a systematic approach to evaluation, working practices can continually evolve, thereby increasing employee motivation, developing beliefs and positively influencing environmental behaviour.

7 Conclusions

This research project took a novel approach to examining workplace PEB. Previous research is either based around empirical studies on specific activities, or multi-level explanations of workplace environmental behaviours that are theoretical in nature. In response to a lack of knowledge as to what works in real-world workplace behaviour change programmes, this project combined a theoretical approach with original research. Results from the two studies were analysed to develop a framework to support practitioners delivering PEB change initiatives, and help workplaces move to a more evidence-based model of practice.

Main findings from the research were that organisational leadership and the actions of managers and supervisors are the strongest determinants on employee engagement in pro-environmental actions through influences to the social norm within organisations. At intervention level there is evidence of a positive impact of promotional activities, and measures to increase employee motivation. However, there is also a distinct lack of research in this area relating to context and results of studies all suffer from poor external validity, thereby making it difficult to apply results to workplaces wishing to run initiatives. For this reason it is concluded that on-going evaluation is required with any workplace programme if benefits are going to be maximised.

Despite the challenges posed by a lack of reliable evidence in places, it was still possible to meet the aims of the project and produce a framework that can help improve outcomes to behaviour change programmes in the future. Making sense of such a broad range of research and PEBs was challenging, but the objectives were successfully met by incorporating findings from an actual workplace programme into the study, describing the current knowledge with regard to workplace PEB, and interpreting the data in a way that can be applied to real-world scenarios.

7.1 Limitations

A number of limitations were encountered during the research. The most significant was the small subject population for the survey. Whilst it was beneficial to have this insight into a live behaviour change programme, the number of subjects mean this can only be considered as a pilot study.

The framework had to be built on the literature available in the workplace environmental behaviour area, and this in itself presented limitations. On examination many of the papers were exposed as having methodological limitations (Möser and Bamberg, 2008), which reduced the external validity. The research was also time limited. Although the objective of producing a behaviour change framework was achieved, there was not sufficient time test this in the field, and therefore evaluate the effectiveness of what was produced.

Greater subject numbers, identifying or conducting higher quality research into the effectiveness of interventions, and feedback from testing the framework in the field would collectively make a significant difference to the academic rigor of this report.

7.2 Future research

Through our wide examination of the research in this field many areas in need of further research have been uncovered. How these are prioritised will depend on specific objectives. In answer to the ‘what works?’ question; education, goal setting, and other intervention and motivation markers all require more work. As identified by Inoue and Alfaro-Barrantes (2015), there are still topics that have seen no research, such as interactions between people and their use of technical environmental solutions which has large impact potential. However, from the point-of-view of this research, the priority is test the framework that has been developed in this project. Whilst the researchers has based the model on existing evidence and original data, any framework is just a concept until applied to a workplace environmental. Not only that, the aim was

to produce a framework with universal application, and therefore further examination needs to take place in a number of different industry sectors with organisations of different sizes and cultures. Feedback would help to identify the specific intervention measures in need of more research, to enable further refinement of the model.

7.3 Summary

There is a need for workplaces to do more to help tackle climate change, but to date employee interventions have typically concentrated on specific behaviours rather than focussing on organisation wide cultural changes. A top-down hierarchical approach to addressing behaviour change is likely to yield the greatest benefits to organisational markers of success, and benefits to the wider environment. CEO's and senior management need to go beyond policy writing and imbed sustainability in all company activities if they want to lead a workplace where PEB is the social norm. The use of the behaviour change framework developed in this report gives organisations a tool to help guide decision making, that can be adapted to suit the needs each workplace.

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9 Appendices

9.1 Appendix One: Birmingham Airport Survey



I save energy



Low Carbon
Maintenance
& Buildings



Birmingham Airport Energy Champions Survey

What is the purpose of this survey?

The Birmingham Airport Energy Champions Project is an example of an intervention used to improve the environmental performance in an organisation. The aim of this project is to improve our understanding of how these initiatives are evaluated, and if there are predictors of employees energy related behaviour.

Who is this study being run by?

This study is run as a joint project by Low Carbon Maintenance and Buildings, who run the Energy Champions programme at Birmingham Airport, and De Montfort University who will collect and analyse the results.

Why have I been invited to participate?

We are seeking the views of a range of staff, including Energy Champions; staff indirectly involved in the Energy Champions project, and staff not involved in the project. This will help us to understand different viewpoints, and conduct a more thorough evaluation of the project.

What will I have to do if I decide to take part?

You are asked to complete the survey by clicking 'Next' at the bottom of this page. The survey should take no more than 15 minutes.

Do I have to take part in this study?

No. Completing this survey is entirely voluntary.

Will my taking part be kept confidential?

Yes. Your name is not collected, and no personal identifying information will appear in any write up of this project.

Ethical Approval

This project has been approved by the Faculty of Technology Human Research Ethics Committee at De Montfort University in Leicester.

Further information

If you would like more information about the project please contact Tom Cudmore via e-mail:

@myemail.dmu.ac.uk or phone:

* 1. Please confirm:

I have read the above information and agree to take part in this survey

Birmingham Airport Energy Champions Survey

This survey will ask for your opinion on a number of factors relating to workplace behaviours and actions that have a positive impact on the environment.

Note, answers should relate only to workplace behaviour. Please answer all questions honestly, all information is recorded anonymously. If you have any questions or queries please contact Tom Cudmore via e-mail: p14187212@myemail.dmu.ac.uk or phone: 07939 124576.

*** 2. What is your gender?**

- Male Female Prefer not to say

*** 3. What is your age?**

- 16 to 24
 25 to 34
 35 to 44
 45 to 54
 55 to 64
 65 to 74
 75 or older

*** 4. What is your highest level of education?**

- No formal qualifications
 GCSE/ O Levels
 A Levels
 HND/ BTEC/ Vocational qualifications
 University undergraduate degree
 University postgraduate degree
 Other

*** 5. Are you a Birmingham Airport Energy Champion?**

*** 6. Are you a manager or supervisor involved with the Energy Champion programme (but are not an Energy Champion)**

Birmingham Airport Energy Champions Survey

*** 7. How were you selected to be an Energy Champion?**

- I put myself forward
- I was put forward by my manager
- I was put forward by another colleague
- Other

*** 8. What would you personally like to achieve in your role as an Energy Champion?**

*** 9. What would you consider success to mean in the context of the Energy Champions project as a whole?**

*** 10. Identify from the list below the three factors you consider to be the most important indicators of success when evaluating the Birmingham Airport Energy Champions programme (1 being the most important)**

	Preference
To increase the number of staff engaged in pro-environmental behaviour in the workplace	<input type="text" value="1"/>
To make financial savings for the airport	<input type="text" value="2"/>
To help achieve the relevant accreditation (for example, ISO:0991/14001)	<input type="text" value="3"/>
To reduce the carbon emissions of Birmingham Airport	<input type="text" value="4"/>
To achieve corporate social responsibility objectives	<input type="text" value="5"/>
To help meet the organisations statutory obligations and responsibilities for sustainability	<input type="text" value="6"/>
To build relationships between staff across departments	<input type="text" value="7"/>

*** 18. To what extent are the following options realistic in your situation?**

	0 = No realistic at all	1	2	3	4	5 = Very realistic
To always use the recycling facilities and switch off unused electrical items when at work	<input checked="" type="radio"/>					
To use walking, cycling and public transport for most work related journeys including commuting	<input type="radio"/>					
To increase the impact I have on sustainability at Birmingham Airport	<input checked="" type="radio"/>					

*** 19. Taking everything into consideration, how would you evaluate the advantages and disadvantages of Birmingham Airport doing everything in their power to promote sustainability?**

0 = Predominately disadvantages	1	2	3	4	5 = Predominately advantages
<input checked="" type="radio"/>					

*** 20. Taking everything into consideration, to what extent do you agree with the following statements?**

0 = Completely disagree	1	2	3	4	5 = Completely agree
I will always engage in pro-environmental behaviours at work	<input checked="" type="radio"/>				
I would consider engaging in more pro-environmental behaviours at work	<input type="radio"/>				

*** 21. Taking everything into consideration, to what extent do you agree that sustainability in the workplace needs to take higher priority?**

0 = Completely disagree	1	2	3	4	5 = Completely agree
<input checked="" type="radio"/>					

*** 22. The company should...**

	0 = Completely disagree	1	2	3	4	5 = Completely agree
Make it compulsory that staff engage in certain pro-environmental behaviours	<input checked="" type="radio"/>					
Make it easier for staff to engage in pro-environmental behaviour	<input type="radio"/>					
Reward staff who engage in pro-environmental behaviour	<input checked="" type="radio"/>					

23. If you have any other comments about the Energy Champions project, or environmental sustainability at Birmingham Airport please enter them below.

END OF SURVEY