* Using Styles to structure your report

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1. Use the References tab to automatically create a table of contents.

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# 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 do 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. The 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 is 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 considerations. 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 measureable/ 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 measureable, 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

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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 widerange 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 organisational 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.