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SUSTAINABLE BEHAVIOUR IN THE WORKPLACE
The role of universities in promoting pro-environmental behaviour

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TO WHOM IT MAY CONCERN

As Coordinators of the doctoral dissertation presented by ADINA DUMITRU, on "SUSTAINABLE BEHAVIOR IN THE WORKPLACE: The role of universities in promoting pro-environmental behavior".

We acknowledge that this dissertation fulfills all the necessary scientific requirements and conditions to be presented and defended publically in front of the corresponding committee.

We sign this document with the aim of approving its presentation and defense, in A Coruña, the 29th of June of 2015.

A QUEN CORRESPONDA

Na nosa calidade de directores da tese de doutoramento presentada por ADINA DUMITRU, sobre "COMPORTAMENTO SUSTENTABLE NO LUGAR DE TRABALLO: O papel das universidades na promoción de conducta proambiental".

Acreditamos que esta tese cumple coas condicións técnicas e científicas necesarias para ser presentada e defendida públicamente frente a o correspondente tribunal.

O que asinamos aos efectos de aprobar a súa presentación e defense, en A coruña, a 29 de Xuño de 2015.

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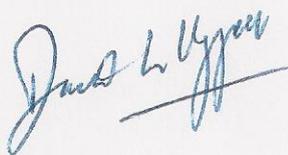
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"Don't be distracted by the myth that 'every little helps'. If everyone does a little, we'll achieve only a little."

David MacKay, *Sustainable energy: without the hot air*

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Abstract

Organizations and their employees are among the largest users of the world´s energy resources (Kempton, Darley, & Stern, 1992; Oskamp, 2000; Stern, 2000). Recently, there has been a growing recognition of the role of universities in the transition towards a more sustainable society in recent years (Ki-Hoon et al., 2013; Lans et al., 2014; Sedlacek, 2013).

The present research investigates the barriers to and drivers of pro-environmental behaviour in a public higher education organization, in three categories of practices: consumption of materials and energy, waste generation and management, and work-related mobility. After performing an exploration of workers´ perceptions, it investigates the role of structural, organizational and individual factors in the adoption of pro-environmental behaviour in organizations and in the creation of contexts that support innovation leading to sustainable organizational change. The studies reported were carried out taking a public university in Galicia (Spain) as a case study, and used a multi-method approach that included focus groups, in-depth interviews, a questionnaire and a back-casting scenario development methodology. Results give support to predictive models of pro-environmental behaviour that postulate a normative route to behaviour for both workers and students, and point to the potential for organizations to become autonomy-promoting contexts that encourage the pro-active engagement of workers in formulating and implementing creative sustainability sollutions.

Keywords: pro-environmental behaviour at work, autonomy-promoting contexts, organizational culture, social norms.

Resumen

Las organizaciones y sus empleados son algunos de los mayores consumidores de los recursos energéticos a nivel mundial (Kempton, Darley, & Stern, 1992; Oskamp, 2000; Stern, 2000). En los últimos años, hay cada vez mayor reconocimiento del papel que juegan las universidades en la transición hacia una sociedad más sostenible (Ki-Hoon et al., 2013; Lans et al., 2014; Sedlacek, 2013).

La presente investigación analiza las barreras y los facilitadores del comportamiento pro-ambiental en una organización pública de educación superior, en tres categorías de prácticas: el consumo de materiales y energía, la gestión de residuos y la movilidad relacionada con el trabajo. Después de llevar a cabo un análisis de la percepción de los trabajadores, se han analizado los factores estructurales, organizacionales e individuales que influyen en la adopción de comportamientos sostenibles en las organizaciones y en la creación de contextos que estimulen la innovación para el cambio organizacional sostenible. Los estudios se han llevado a cabo en una universidad pública gallega, adoptando un enfoque multi-método, que incluye grupos focales, entrevistas en profundidad, un cuestionario, y una metodología para el desarrollo de escenarios de futuro. Los resultados obtenidos a través del test de modelos predictivos muestran la importancia de los procesos de influencia social tanto para los trabajadores como para los estudiantes, y apuntan al potencial de las organizaciones para convertirse en contextos que promueven la autonomía e incentivan la implicación activa de los trabajadores y estudiantes en la busqueda de soluciones para la sostenibilidad.

Palabras clave: comportamiento pro-ambiental, autonomía, cultura organizacional, normas sociales.

Resumo

As organizacións e os seus empregados son algúns dos maiores consumidores dos recursos enerxéticos mundiais (Kempton, Darley, & Stern, 1992; Oskamp, 2000; Stern, 2000). Nos últimos anos, cada vez hai un maior recoñecemento do papel que xogan as universidades na transición cara a unha sociedade máis sustentable (Ki-Hoon et al., 2013; Lans et al., 2014; Sedlacek, 2013).

A presente investigación analiza as barreiras e os facilitadores do comportamento pro-ambiental nunha organización pública de educación superior, en tres categorías de prácticas: o consumo de materiais e enerxía, a xestión de residuos e a mobilidade relacionada co traballo. Despois de levar a cabo unha análise das prácticas existentes e da súa percepción por parte dos traballadores, analizáronse os factores estruturais, organizacionais e individuais que inflúen na adopción de comportamentos sustentables nas organizacións e na creación de contextos que estimulen a innovación para o cambio organizacional sostible. Os resultados obtidos a través do test de modelos preditivos mostran a importancia dos procesos de influencia social tanto para os traballadores como para os estudantes, e tamén apuntan ao papel clave da cultura, o clima e a estrutura organizacional na xeración de obstáculos ou potenciadores dos comportamentos sustentables.

Palabras clave: comportamento pro-ambiental no traballo, autonomía, cultura organizacional, normas sociais.

Resumen ampliado

Hoy existe un consenso científico amplio que postula que el cambio climático es en gran medida el resultado de la acción humana (Gardner y Stern, 2002; Vlek y Steg, 2007) y que la mitigación de sus efectos deberá incluir cambios significativos en nuestras prácticas, dado que las soluciones tecnológicas por sí solas, no conseguirán una reducción suficientemente rápida de los gases de efecto invernadero. Las nuevas tecnologías, incluidas las más verdes, son efectivas solamente si están asimiladas por el ser humano, dependiendo del uso que se les da (Midden, Kaiser y McCalley, 2007). Los informes sucesivos del IPCC han dejado claro que la velocidad del cambio climático requiere de la acción conjunta de toda la sociedad para reducir y afrontar sus consecuencias, y que centrarse solamente en el cambio de los procesos de producción es insuficiente debido al efecto rebote (Hertwich, 2011).

Las organizaciones y sus empleados son algunos de los mayores consumidores de recursos energéticos a nivel mundial (Kempton, Darley, y Stern, 1992; Oskamp, 2000; Stern, 2000). Las corporaciones han empezado a reconocer cada vez más la importancia de las prácticas corporativas éticas y responsables para su supervivencia y su legitimidad (Dunphy *et al*., 2003). La responsabilidad social corporativa ha sido definida como un abordaje de la economía a través del cual las compañías integran de manera voluntaria consideraciones económicas, sociales y medioambientales en sus estrategias de negocios en un intento de contribuir con la sociedad de una forma sostenible (Dahlsrud, 2008). No obstante, otros autores han subrayado el efecto perverso que las estrategias de responsabilidad corporativa

pueden tener cuando conducen al aislamiento y a la descontextualización de asuntos complejos y socialmente controvertidos mientras que simultáneamente favorecen la legitimidad social de las corporaciones frenando así los esfuerzos por conseguir cambios más significativos (Schwartz y Tilling, 2009).

La demanda de responsabilidad social y medioambiental en organizaciones, junto con el incremento del consumo de energía y sus costes asociados, han provocado un mayor interés en las mismas por encontrar maneras de promover el comportamiento sostenible en el lugar de trabajo (Scherbaum *et al*., 2008; Anderson y Bateman, 2000). Hasta la fecha, no obstante, las estrategias más comunes se han centrado en cambios estructurales y operativos como reemplazar el equipamiento ineficiente o variar parte de los procesos de las empresas, ya que estas modificaciones tienden a ser más sencillas (Scherbaum et al., 2008).

Asimismo, en los últimos años, hay cada vez un mayor reconocimiento del papel que juegan las universidades en la transición hacia una sociedad más sostenible (Ki-Hoon et al., 2013; Lans et al., 2014; Sedlacek, 2013). Las universidades son lugares de trabajo, pero también son organizaciones que juegan un papel muy importante en la educación de los más jóvenes para el desarrollo de comportamientos sostenibles (Blok *et al*., 2013) y su papel se ejercita tanto explícitamente (a través de los contenidos educativos, Lambrechts *et al*., 2013; Pappas *et al*., 2013), como implícitamente, a través del modelado del comportamiento ambiental (Lukman *et al.,* 2013) y la facilitación de la adquisición de hábitos pro-ambientales.

Gran parte de la investigación sobre sostenibilidad se ha centrado en las organizaciones y su comportamiento ambiental como organizaciones unitarias (Lo et al., 2012b). Los factores externos que influyen en las políticas de sostenibilidad de las organizaciones han sido

agrupados en varias categorías: legislación y presión de los *stakeholders* (González-Benito and González-Benito, 2006, Gadenne et al., 2009); atención mediática (Bansal, 2005); estructuras del mercado (Vázquez-Brust y Liston-Heyes, 2010); y la incertidumbre y complejidad del contexto organizacional (Aragón-Correa y Sharma, 2003). No obstante, muy poca investigación se ha centrado en los intentos organizacionales de impulsar el comportamiento pro-ambiental de los trabajadores o de promover un contexto en el cual los trabajadores puedan aportar iniciativas e ideas para cambiar las prácticas, los procedimientos y los productos organizacionales.

El comportamiento pro-ambiental en el lugar de trabajo ha sido pocas veces el objeto de análisis y muchos estudios se han centrado en el comportamiento de los líderes considerando irrelevante el comportamiento de los trabajadores que no ocupan cargos de responsabilidad. Recientemente, el interés en el comportamiento de los trabajadores ha crecido, pero la investigación en este campo sigue siendo escasa.

La presente investigación tiene como objetivo emprender un análisis comprehensivo del comportamiento pro-ambiental en una organización pública de educación superior en tres categorías de prácticas: el consumo de los materiales y energía, la gestión de residuos y la movilidad relacionada con el trabajo. Tanto el comportamiento de los trabajadores como el de los estudiantes han sido analizados. Con el objetivo de avanzar el conocimiento en esta área, hemos formulado las siguientes preguntas de investigación:

- ¿Cuáles son las condiciones necesarias para que la universidad se convierta en una organización que promueva el comportamiento pro-

ambiental así como una cultura de sostenibilidad entre sus trabajadores, estudiantes y la comunidad en general?

- ¿Qué puede hacer la universidad para promover la adopción del comportamiento ambiental y su transferencia a otras áreas de la vida diaria?

- ¿Cómo puede ir más allá de la incentivación del comportamiento de bajo esfuerzo para promover un contexto en el que tanto trabajadores como estudiantes puedan gozar de la autonomía necesaria para ser promotores del cambio organizacional y social sostenible?

A partir de estas preguntas generales, se han formulado una serie de preguntas más especificas:

1. ¿Cual es el nivel de eficacia de las políticas universitarias para la sostenibilidad y cuanto se apoya el comportamiento sostenible?

2. ¿Cuales son las barreras y los potenciadores del comportamiento diario sostenible en la universidad?

3. ¿Que papel juegan los factores estructurales y organizacionales en la facilitación del comportamiento ambiental?

4. ¿Cual es el papel que juegan los procesos de influencia social en el comportamiento sostenible en el lugar de trabajo? ¿En particular, cual es el efecto de las normas sociales sobre el comportamiento ambiental de trabajadores y estudiantes?

5. ¿Cual es el papel que juegan los factores individuales en el comportamiento ambiental en la universidad?

6. ¿Cual es la relación entre el comportamiento desempeñado en el lugar de trabajo y el de casa? ¿Existe transferencia de comportamiento entre los dos espacios de la vida diaria?

7. ¿Cuales son las interacciones relevantes entre estas dos categorias de factores en la determinación del comportamiento sostenible en el lugar de trabajo?

8. ¿Cuales son las condiciones para establecer un proceso que promueva tanto la participación como el compromiso con la política ambiental de la universidad?

Para contestar a estas preguntas se han formulado las siguientes estrategias metodológicas (E.M):

E.M. 1: Hacer un diagnóstico de las percepciones de las barreras y potenciadores del comportamiento sostenible en la universidad, por parte de trabajadores y estudiantes.

E.M. 2: Analizar los factores estructurales y organizacionales que influyen en el comportamiento pro-ambiental en la universidad para diferentes actores, así como en las posibilidades de que los trabajadores puedan introducir cambios organizacionales pro-ambientales.

E.M. 3: Analizar los factores individuales que influyen en el comportamiento pro-ambiental de trabajadores y estudiantes en la universidad, así como en la transferencia de comportamientos entre el trabajo y la casa:

- Analizar los factores individuales que influyen en el comportamiento pro-ambiental de los dos grupos en la universidad;
- Identificar el *spillover* entre los comportamientos del trabajo y de casa, y las barreras y los potenciadores de este fenómeno;
- Investigar el efecto de ocupar una posición de liderazgo sobre el comportamiento ambiental.

E.M. 4: Proponer y testar modelos predictivos del comportamiento ambiental que consideren, por un lado, el papel de las motivaciones vinculadas con los valores, y por otro, el de los procesos de influencia social.

E.M. 5: Promover un proceso de participación que contribuya a la formulación de políticas ambientales y al compromiso de la comunidad universitaria con la sostenibilidad.

Los estudios llevados a cabo emplean un enfoque multi-método. El primer estudio se centra en la elaboración de un diagnóstico de políticas y prácticas organizacionales a través de grupos focales. El segundo estudio se centra en el análisis de los factores estructurales y organizacionales que influyen en el comportamiento pro-ambiental en la universidad a través de entrevistas con miembros del equipo director. Este estudio analiza también las posibilidades para iniciativas desde abajo-arriba que puedan contribuir al cambio

organizacional y fortalecer las condiciones para la transferencia de comportamiento entre los ámbitos del trabajo y del hogar. El tercer estudio se centra en la investigación del papel que juegan los antecedentes individuales del comportamiento pro-ambiental y en el test de modelos predictivos de comportamiento pro-ambiental en la universidad, focalizando sobre aquellos antecedentes considerados de mayor importancia en la explicación del comportamiento pro-ambiental. Después de obtener una perspectiva amplia sobre las barreras y potenciadores del comportamiento pro-ambiental en la universidad, el cuarto estudio presenta los resultados de una intervención participativa que ha tenido como objetivo la creación de una serie de visiones dinámicas del futuro de la organización en el 2050, y de esta manera, construye el conocimiento necesario para la transición a la sostenibilidad.

Los resultados muestran que la legislación, la regulación, la reputación, la cultura organizacional y las características que tienen que ver con las relaciones verticales y horizontales en el lugar de trabajo se encuentran entre los factores con mayor peso en el comportamiento pro-ambiental en la Universidad. La perspectiva que emerge se caracteriza por una percepción de numerosas barreras para la sostenibilidad que sin embargo, deja muchas oportunidades para el cambio organizacional sostenible sin reconocer y explotar. Factores que pertenecen tanto al contexto externo como al contexto interno de la organización interactúan de modos que explican los niveles de inercia encontrados así como las posibilidades latentes que puedan dar lugar a la adopción de políticas pro-ambientales y a un contexto en el cual tanto trabajadores como estudiantes puedan desarrollar valores, creencias, competencias y hábitos pro-ambientales.

Los resultados también muestran que los procesos de influencia social juegan un papel significativo en el comportamiento pro-ambiental en la universidad, y los modelos predictivos testados a través de la metodología de ecuaciones estructurales demuestran un buen nivel de ajuste. Entre los factores individuales, las normas personales, la identidad y las percepciones de eficacia son los predictores más relevantes del comportamiento pro-ambiental. Se han investigado los antecedentes del los comportamientos considerados en las tres áreas de prácticas analizadas. En el caso de los trabajadores, los factores individuales tienden a jugar un papel más importante que en el caso de los estudiantes, pero en general explican poco de la varianza en el comportamiento ambientalmente relevante. Conjuntamente, los resultados sugieren la necesidad de construir teorías que expliquen el comportamiento ambientalmente relevante para el contexto de las organizaciones, y no importar teorías desarrolladas en el ámbito domestico.

Los comportamientos ambientales tienden a estar más influidos por las normas personales y sociales y los factores organizacionales como la cultura y el clima organizacional, y no tanto por antecedentes individuales generales como valores, nivel de conocimiento o identidad ambiental. Estos resultados son coherentes por ejemplo con la investigación previa en el área de movilidad en el ámbito privado (Bamberg y Schmidt, 2003; Hunnecke *et al.,* 2001) y con la investigación de los factores que determinan opciones de movilidad sostenible en el trabajo (Lo *et al.*, 2013). El papel de las normas sociales indica una vía prometedora para las intervenciones en organizaciones. Investigaciones previas han subrayado el papel que juega el comportamiento pro-ambiental visible de los líderes en las organizaciones (Norton *et al.*, 2014) o el papel del apoyo de los supervisores al comportamiento pro-ambiental de los

trabajadores (Ramus y Kilmer, 2007; Tudor *et al.*, 2008; Linnenluecke *et al.*, 2009). La integración de objetivos ambientales por parte de la universidad en su cultura organizacional haría que los que ocupan posiciones de liderazgo adoptasen comportamientos pro-ambientales que, si fueran visibles, impulsarían la adopción de estos últimos por parte de los trabajadores y estudiantes.

Más allá de ser un lugar de trabajo y una organización pública, la universidad goza de un estatus social particular que constituye una referencia social importante. Debido a las funciones de educación e investigación que el personal de la universidad desempeña, los trabajadores tienden a ser conscientes del hecho de que su comportamiento influye en el de otros. Con el objetivo de indagar en el papel que esto juega tanto en el comportamiento directo (por ejemplo: reciclado) como indirecto (impulsar a otros a actuar de forma pro-ambiental) de los trabajadores, hemos incluido esta dimensión en el estudio y los resultados demuestran que la percepción de tener un rol ejemplar, sí influye significativamente en los dos tipos de comportamiento. Asimismo, para aquellos que perciben su papel como ejemplar, las normas sociales y personales influyen en gran medida en su comportamiento pro-ambiental en el lugar de trabajo. Si la conciencia de tener un papel ejemplar ocupa un papel central en la concepción del yo, es posible que esto haga las normas personales más importantes en contextos donde el comportamiento personal pueda ser analizado y adoptado por otros, como puede ser la Universidad. Dicho de otro modo, el tener un papel ejemplar puede activar en la conciencia sentimientos de responsabilidad moral, que, a su vez, pueden influir en lo que se percibe como comportamiento adecuado en una situación o contexto determinados.

En la investigación de los factores que puedan influir en el comportamiento pro-ambiental, se han definido y testado dos modelos de predicción del comportamiento pro-ambiental tanto para trabajadores como para estudiantes. El primer modelo se basa en las teorías tradicionales del comportamiento ambiental, pero se ha modificado para incluir dimensiones que la investigación previa ha establecido como importantes, y ha sido desarrollado por Ruepert et al. (2012); el segundo explora una vía normativa para la determinación del comportamiento pro-ambiental. En este segundo modelo, se ha postulado que las normas descriptivas influyen en el sentimiento de auto-eficacia, que activan sentimientos de obligación moral para actuar pro-ambientalmente, y que, a su vez, son predictores directos del comportamiento pro-ambiental. Los dos modelos se han testado tanto en el caso de los trabajadores como en el de los estudiantes.

Los resultados han confirmado la importancia de los procesos de influencia social en la adopción del comportamiento ambiental en el lugar de trabajo, con los modelos que postulan una via normativa obteniendo mejores indicadores de fit, que los que planteaban un modelo basado en valores, tanto paa los trabajadores como para los estudiantes. Investigaciones previas han mostrado que la observación del comportamiento de otros, y especialmente de los líderes (Norton *et al.*, 2014), puede contribuir a la adopción de comportamientos pro-ambientales voluntarios. En este estudio hemos podido comprobar los mecanismos a través de los cuales esta influencia se produce. Las normas descriptivas, tanto generales como locales, contribuyen a una experiencia de mayor auto-eficacia a través del modelado de nuevos comportamientos, y puede que también favorezcan la percepción de que la mayoría de las personas aportan en justa medida a la mejora ambiental, lo que, a su vez, puede incrementar la

sensación de que la contribución personal vale la pena (Strauss *et al.*, 2009). El hecho de que el comportamiento ambiental dependa de la percepción de que otros también contribuyan en de un modo justo, hace que sea necesario que el comportamiento de otros sea visible para incrementar las percepciones de autoeficacia. La percepción de que otros actúan de forma pro-ambiental, junto con el sentimiento de auto-eficacia percibida, activan un sentimiento de obligación moral para actuar de forma pro-ambiental, y estos últimos son predictores directos de por ejemplo el comportamiento de reciclado en la universidad.

Finalmente, los resultados indican que la transferencia de comportamientos entre diferentes áreas de la vida se produce en muy poca medida, lo que se explica por las diferencias estructurales entre contextos así como por las características de las fronteras entre estos (Uzzell et al., 2012).

Las universidades pueden jugar un papel clave en la educación de generaciones presentes y futuras para la adopción de comportamientos pro-ambientales. Como organizaciones públicas y lugares de trabajo, éstas se pueden convertir en promotores de la sostenibilidad. Como organizaciones gobernadas democráticamente, están muy bien posicionadas para ser modelos en la transición hacia una sociedad sostenible. Finalmente, como las universidades son responsables de la educación de las futuras generaciones, deben formar ciudadanos autónomos capaces de encontrar soluciones a problemas complejos e innovar para conseguir estilos de vida sostenibles en Europa.

1. Literature review on factors influencing pro-environmental behaviour

1.1 Introduction

Pro-environmental behaviour has been intensely studied within the field of pro-environmental psychology, especially since the disciplinary focus has changed from a study of the transactions of people with the physical environment, to a climate change mitigation focus. There is a wide consensus among experts today that climate change is in great part a result of human action, according to the findings of the the Intergovernmental Panel on Climatic Change (IPCC) Fourth Assessment Report (2007) and that mitigation of its effects will have to include significant changes in human practices, as technological fixes alone are not going to provide a sufficiently fast-paced reduction in greenhouse gas emissions. Furthermore, even advances in new and greener technologies are only effective insofar as they are assimilated, and as such they are dependent on the use people make of them (Midden, Kaiser and McCalley, 2007). The IPCC report has made clear that the speed of climate change effects requires a concerted societally-wide approach to reduction and mitigation, and that a focus on changing towards cleaner production processes is insufficient due to rebound effects (Hertwich, 2011). Human patterns of behaviour are leading to increasing resource scarcity, loss of biodiversity and global warming with its disastrous effects. Patterns of consumption and production are in great part responsible for these effects, and considerable efforts have been dedicated by international bodies and the European Union in particular, to finding ways to encourage change in a sustainable direction. However, in spite of the many advances, we are still far from achieving a full transition to a low carbon society and it seems hope for averting the 2 degrees increase in global temperature has been abandoned.

A lot of the efforts to change environmentally-relevant human behaviour have started from the assumption that awareness of climate change and an understanding of the magnitude of the problem would lead to significant take-up of pro-environmental behaviour. Interventions

have thus been based on an information-deficit model, in which increasing knowledge of climate change effects and relevant mitigation behaviour has been the focus of a wide range of campaigns and policies (García-Mira et al., 2005). However, large scale surveys such as Eurostat consistently show that citizens are very aware of the problem of climate change; they are concerned about it and are also willing to do something to mitigate their effects, but this does not translate into significant lifestyle change. Complex social, political and economic processes seem to play a key role in this inertia.

Pro-environmental behaviour has been conceptualized as a type of behaviour that consciously seeks to minimize the negative impact of one's actions on the natural and built environment (Kollmuss and Agyeman, 2002). However, this definition focuses on the intentional dimension of behaviour, and ignores its impact, a problem that afflicts much of the work carried out by psychologists. A good classification of pro-environmental behaviour has been proposed by Stern (2000), who suggested that environmentally-relevant behaviour can be judged on both intent and impact. If we consider impact, environmentally-relevant behaviour can be classified as high, medium and low-impact, depending on the extent of carbon-reduction that it can achieve. There is, however, a range of behaviours that do not have a high impact in terms of emissions reduction but they are psychologically relevant in terms of being intentional and thus holding the potential for wider changes in lifestyles. If intention is considered, behaviours can be divided in intentional and unintentional, with many authors recently arguing that developing intentional pro-environmental behaviour should be the target of interventions, as supporting unintentional pro-environmental behaviour through strategies like nudging (Thaler and Sunstein, 2008) or choice editing is very costly (each type of behaviour needs to be supported through these strategies) and it has a high risk of

fluctuations, as people can choose unsustainable behaviours whenever the support is not maintained (Steg *et al.,* 2014; Uzzell *et al.*, 2015). Such strategies are based on simple behaviorist principles and change is likely to be more lasting if grounded in socially embedded models of change.

Recently, the additive approach to behaviour change has also started to be criticized for not delivering on the promise of proposing viable solutions to a sufficiently fast-paced transition to sustainability (Steg et al., 2014; Dumitru *et al*., *in press)*. This perspective is supported by research on the changing energy requirements of activities over time (Jalas, 2005) which shows that in spite of less energy being required for certain activities due to energy efficiency improvements, energy requirements have risen, due to an increase in demands and patterns of consumption (Hertwich, 2011). Alternative proposals have been diverse, ranging from work-home-third places domains through which people cross daily (Uzzell *et al.,* 2012), an integrated framework for encouraging pro-environmental behaviour as an alternative to this piecemeal approach (Steg *et al*., 2014), to a time-use perspective in the study of lifestyles (Dumitru *et al.*, in press).

Furthermore, people carry out their activities in different contexts or places and these are relevant in terms of the constraints and opportunities for different types of behavior. Behavioral interventions designed for one life domain and certain spaces might not be possible or effective in another. One way to account for the importance of place is to consider individuals as "border crossers" (Clark, 2000), undertaking their activities in a variety of life contexts governed by different logics. This is both a problem and an opportunity from a lifestyle change perspective: a problem due to the fact that lifestyle change requires an understanding of behaviour in these different life contexts, which makes the design of policy

to support behaviour change all the more complicated; and an opportunity, if an understanding is reached of what is necessary to stimulate a transition to more sustainable practices in each of these domains, and to ensure conditions are in place for practices to be transferred from one life domain to another, thus potentially multiplying the effect of interventions across contexts of everyday life. While a lot of behavioural change research has focused on home as one of the key domains of everyday life, interest has recently grown in the exploration of the workplace as an area in which sustainable behaviours can be learned and promoted. This has been due, in part, to an understanding of the role of organizations as producers of significant amounts of greenhouse gas emissions and the potential they hold to steer behaviour in a sustainable direction.

Large organizations are responsible for a significant amount of greenhouse gas (GHG) emissions. An estimation in the year 2000, which considered eight different categories of sources of GHG emissions (industrial processes, power stations, transportation fuels, among others), showed that the potential contribution of large organizations to global warming over the next 100 years will be highly significant: 72% Carbon dioxide, 18% Methane, 9% Nitrous Oxide of the total share of emissions within the EU (Emission Database for Global Atmospheric Research, 2000).

Redressing ongoing ecological degradation and prevent future degradation have been considered among the most prominent challenges organizations face today (Andersson *et al.*, 2013). As a result of these new regulations, organizations have also started to implement mechanisms to reduce their GHG emissions, sometimes going beyond the standards established by them. However, as stated in the EU Sustainable Development Strategy Review 2009, these strategies have not been sufficient to ensure significant reduction rates. Reaching

the target of maintaining world temperature under 2 or (more recently) 4 degrees Celsius of increase in global warming by 2050 requires concerted and further-reaching strategies to promote pro-environmental practices in all domains of everyday life. Besides their contributions to overall GHG emissions, large-scale organizations also hold a great potential for social influence, as they can reach large numbers of individuals and become spaces for social learning and behavioural change. Organizations have increasingly taken up sustainability, either as a core part of their organizational strategy, or as part of their corporate social responsibility agenda (Lo *et al.,* 2012b).

1.2 Sustainable behaviour in organizations

1.2.1 The role of organizations in the mitigation of climate change

Organizations and their employees are among the largest users of the world´s energy resources (Kempton, Darley, and Stern, 1992; Oskamp, 2000; Stern, 2000). Corporations have increasingly started to recognize the importance of ethical and responsible business practices to their survival and legitimacy (Dunphy *et al.*, 2003). Corporate social responsibility has been defined as a business approach to sustainable development through which companies voluntarily integrate environmental, social and economic concerns with their business strategies in a quest to contribute to society in a sustainable way (Dahlsrud, 2008, cited in Wesselink *et al.*, 2014). However, other authors have underlined the perverse effect that corporate social responsibility can have in leading to the isolation and de-contextualization of

complex and contested issues while at the same time favouring companies' social legitimacy (Schwartz and Tilling, 2009) and actually stalling efforts to undertake more significant changes. Demands for social and environmental responsibility in organizations, together with raising consumption of energy and associated costs have led to an increase of the interest of organizations in ways to promote energy conservation at work, for example (Scherbaum *et al.*, 2008; Anderson and Bateman, 2000). To date, however, most common strategies have focused on structural and operational changes such as removing or changing inefficient equipment or changing business processes, as these changes tended to be easy (Scherbaum et al., 2008). These types of solutions place an emphasis on technological fixes and do not take into account the fact that changing behaviors might prove to be a more cost effective, as well as more sustainable sollution. Technological solutions have been showen to also lead to reductions in perceptions of personal responsibility for behavior (Murtagh et al., 2015).

Corporate social responsibility is a broad concept combining both social and environmental performance (Orlitzky, Schmidt, and Rynes, 2003). Corporate social responsibility reflects the new societal belief that organizations are not only accountable to their shareholders, but to a larger community that includes employees, consumers, suppliers, policy-makers, and local and global communities, as these often have to bear the costs of their activities. Corporate environmental performance has been defined as organizational performance in managing natural resources and the natural environment in the process of conducting business, including both environmental initiatives and outcomes (Ones and Dilchert, 2012).

In recent years, the raising awareness that outcomes are not sufficient to stop global warming, biodiversity loss, or the depletion of basic life-supporting resources, together with the

intensification of both stakeholder and policy pressure, have lead some organizations to make efforts to incorporate a perspective of interconnectedness of environmental, social and economic sustainability as part of their long-term strategy. This perspective is known as the triple bottom line, by which organizational success is defined in terms of three major pillars: profits, planet and people (Elkington, 1997). It is difficult to say if this is a real change in the awareness of organizations that their long-term success depends on performance on these three dimensions, or whether the change in global perceptions of the role of organizations in either supporting or hindering climate change efforts is driving them to construct a discourse and perform "greenwashing" as a way to ensure higher profits. It is likely that these two trends exist in parallel even within the same organizations, and organizational change is driven by a series of different forces.

Independently of the cause for this shift in discourse, some positive trends can be identified. On the one hand, it has been acknowledged that the conventional view in economics places environmental sustainability against economic success, and large corporations have been accused of giving up on their responsibility to bear the costs of their activities (Ones and Dilchert, 2012). This has resulted in a discourse that frames the environment as being ad odds with the provision of jobs, which is a justification businesses use to account for non-action (Räthzel and Uzzell, 2011). Organizations first reacted by becoming involved in mitigating the environmental costs of their activities but it is considered that this strategy is becoming outdated (Ones and Dilchert, 2012), and they are increasingly going towards proactive and voluntary initiatives to ensure long-term sustainability. A study by D´Mello *et al.* (2011) had

found that almost 75 % of pro-environmental initiatives reported in 635 companies were proactive and voluntary (cited in Ones and Dilchert, 2012).

Ones and Dilchert (2012) have signalled five different indicators of organizations increasingly aiming to become promoters of sustainability:

- Organizational efforts for sustainability are increasing, both in overall number and types of initiatives. The most common ones are: recycling, reducing the use of energy and natural resources and changing towards more environmentally-friendly products and processes.

- Sustainability reporting has changed from a focus on environmental outcomes to detailed reporting and external ratings of organizations, and from being motivated by public accountability and cost to being motivated by a desire to drive real progress through the improvement of internal processes.

- Attitudes of managers have changed towards seeing spending on environmental initiatives as an investment instead of as a cost (Accenture, 2011, cited in Ones and Dilchert, 2012). Managers also appear to engage in more environmentally friendly behaviours than non-managers (Ones et al., 2010). An increasing number of companies have created top-level positions to oversee sustainability efforts (Deutsch, 2007, cited in Ones and Dilchert, 2012). However, considering the creation of top-level positions as an indicator of sustainability becoming part of the core business understanding of organizations might reflect an organizational interest in generating and maintaining a positive image, while obscuring the reality of everyday practice, as a recent FP7 project (i.e.: LOCAW) has shown through the study of two transnational

corporations (Volvo and Shell). The project results indicated that although these corporations had crated specific top-level positions to push for sustainable changes, if analyzed in comparison with the resources and top-management level positions for other issues such as quality assurance or health and safety, they tended to be marginal and driven by concerns for reputation and the need to comply with the regulators' pressure on cutting down emissions (Uzzell *et al.*, 2012).

- More organizations have designed policies to promote employees´ pro-environmental behaviour, which has contributed, in part, to the "individualization" of the problem.

- A tendency towards the greening of jobs, defined as "the extent to which green economy activities (e.g. reducing the use of fossil fuels, decreasing pollution and emissions, increasing energy efficiency) and technologies (renewable energy, tele-work) increase the demand for existing occupations, shape the work and worker requirements needed for occupational performance, or generate unique work and worker requirements" (Dierdorff *et al.*, 2009, p.4). It has been reported that 40 % of organizations are trying to meet the needs of the green economy through changes in jobs (Ones and Dilchert, 2012).

Among the mechanisms employed for greening organizations, the adoption of environmental standards for products and management systems have been proposed as instruments for improving organizational environmental performance (Delmas and Young, 2009). These are reflected in the Environmental Management System Standard ISO 14001 and in systems for organic certification adopted around the world (Delmas and Grant, 2010). Contradictory perspectives can be found in the literature, with some researchers considering that large organizations are more likely to have environmental management systems in place (King and

Lenox, 2000; Brio and Junquera, 2003), while others have documented that this might not be the case (Tudor et al., 2008).

A lot of the existing sustainability research focusing on organizations has looked at their performance at an aggregate level (Lo et al., 2012b). External determinants of sustainability policies in companies have been grouped in several categories: legislation and stakeholder pressure (Gonzalez-Benito and Gonzalez-Benito, 2006, Gadenne et al., 2009); media attention (Bansal, 2005); market structures (Vazquez-Brust and Liston-Heyes, 2010) and the uncertainty and complexity of the organization's environment (Aragon-Correa and Sharma, 2003). However, much less research has focused on the environmental performance of organizations in terms of their attempts to encourage employee pro-environmental behaviour or promote a context in which employees are encouraged to come up with initiatives and ideas to change organizational practices, processes or products. This has been in spite of evidence that a good level of pro-environmental performance of an organization might make it more attractive to competent prospective employees (Greening and Turban, 2000; Grolleau, Mzoughi, and Pekovic, 2012; Turban and Greening, 1997) and labour productivity might be higher, as it has been suggested that individuals who choose to work for "greener firms" might work harder (Brekke and Nyborg, 2008; cited in Delmas and Petkovic, 2012). Recent research has shown that the adoption of environmental standards and the organizational changes they entail lead to an improvement of interpersonal contacts within the organizations, which in turn results in higher labour productivity (Delmas and Petkovic, 2012). Furthermore, it has been suggested that greening behaviours in organizations are both *prosocial behaviours* (pursuing an objective of promoting the welfare of an organization) but they are also "*taking*

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charge behaviours", a category of behaviours considered in the management literature to include a strong value-creation component for organizations (Ramus and Killmer, 2007). As environmentally-relevant behavior has been intensely studied in the home domain, a review of relevant theories in Environmental Psychology is provided in the next section, before going to research on pro-environmental behavior in organizations.

1.2.2 Research on pro-environmental behaviour

Psychosocial determinants of pro-environmental behaviour have been intensely studied in private contexts, in the last decades (useful reviews have been done by Abrahamse, Steg, Vlek, and Rothengatter, 2005; Bamberg and Moser, 2007; Uitdenbogerd, Egmond, Jonkers, and Kok, 2007 etc). Different definitions have been given to pro-environmental behaviour. While some authors consider pro-environmental behaviour as a category of helping behaviour, applied to the environment as a public good, (Griskevicius, Tybur, and Van den Bergh, 2010), most research treat it as a mixture of self-interest and concern for other people, future generations, other species and the environment, as Bamberg and Moser (2007) have defined it in their relatively recent meta-analysis of the psycho-social determinants of pro-environmental behaviour.

In the last decades, research has been developed in the two directions: firstly, theories postulating a predominance of rational calculations of costs and benefits of behaviour, such as the theory of planned behaviour (TPB, Ajzen, 1991) and, secondly theories that consider the predominance of moral imperatives to act pro-environmentally and focused on identifying the

determinants of the feelings of moral obligations to act pro-environmentally, such as the Norm-Activation Theory formulated by Schwartz (NAM, 1977). A lot of research has been dedicated to testing the different relationships between the dimensions postulated by each theory and to testing the models as a whole. Attempts at combining or adding to these theories have also been made, such as the Value-Belief-Norm theory formulated by Stern, goal framing theory (Lindenberg and Steg, 2007), and the Motivations-Opportunities-Abilities theory (Thøgersen, 1999). I will briefly present these theories and also summarize the results of several attempts made to synthesize research results through meta-analyses performed in recent years.

Theory of Planned Behaviour (Ajzen, 1991)

The theory of planned behaviour (TPB) was formulated to explain all kinds of intentional social behaviour. It is a utility-maximization model starting from the assumption that people's decisions are rational and driven by an evaluation of costs and benefits of a specific behaviour. TPB states that when confronted with the decision of a course of action, people consider the consequences of available alternatives (behavioural beliefs); they weigh the normative expectations of important others (normative beliefs), and they consider required resources and impediments (control beliefs). These considerations lead to the formation of attitudes toward a specific behaviour; subjective norms with respect to that behaviour; and an appraisal of contextual conditions that create specific opportunities and constraints for behaviour which leads to a perception of perceived behavioural. These three components of attitudes, subjective norms and perceived behavioural control or self-efficacy influence the

formation of specific intentions to carry out a behaviour, which, in turn, are the sole direct individual determinant of the behaviour that is finally chosen to be performed. TPB postulates that insofar as the perceived behavioural control is an accurate representation of objective control, it should also be a direct determinant of behaviour.

Applied to the field of pro-environmental behaviour, the theory has been repeatedly tested either in its complete form or partially in numerous studies, being one of the most influential in the field. It has been used to explain a wide range of pro-environmental behaviours such as car use (Abrahamse *et al.*, 2009; Bamberg and Schmidt, 2003), the use of public transportation (Heath and Gifford, 2002;Bamberg and Schmidt, 2003), recycling behaviour (Mannetti et al., 2004; Tang et al., 2011), waste composting (Mannetti *et al.*, 2004), water conservation, green consumerism (Staats, 2003), ecological behaviour (Kaiser and Gutscher, 2003) and pro-environmental behaviour more generally (Oreg and Katz-Gerro, 2006).

Although widely used in pro-environmental behaviour research, the TPB has in general proven to explain a relatively low percentage of the variance in pro-environmental behaviour. A review study by Harland, Staats and Wilke (2007) across a range of pro-environmental behaviours found that the TPB was able to explain from 13 % of the variance in changing light bulbs to more efficient ones, to a maximum of 40 % of the variance in using environmentally-friendly transport but other authors have noted that this was correlated with past behaviour not future behaviour. A recent meta-analysis by Bamberg and Moser (2007) has shown that perceived behavioural control, attitudes and moral norms explain 52 % of the variance in intentions but only 27 % of the variance in actual behaviour.

As the TPB is not a private-sphere specific theory, there have been attempts to apply it to the organizational context, with mixed results as well. For example, recent studies have shown that some components of the TPB can be useful to explain behaviour in companies, such as behavioural intention (e.g. Tudor et al., 2007), while at the same time showing that the TPB might be limited in its ability to explain certain categories of behaviour in organizations, such as sustainable waste management behaviours (Tudor *et al.,* 2008).

Norm-Activation Theory (Schwartz, 1977)

Schwartz's theory of norm activation (Schwartz, 1977; Howard and Schwartz, 1980) was formulated to explain prosocial, altruistic behaviour specifically. The model argues that personal norms, defined as feelings of moral obligation, are the only direct determinants of prosocial behaviour. The theory proposes that behaviour will be in line with moral obligations when one is aware of the consequence of behaviour (to the welfare of others) and when the individual has a sense of personal responsibility for the action. According to this theory, pro-environmental behaviour will be performed when norms are activated in a given situation. The formation and activation of moral norms is based on a mix of cognitive factors (knowledge and awareness of environmental problems), emotional factors, which are based on the experience of guilt and shame as a result of a process of causal attribution through which responsibility for harm is attributed to individual behaviour, and social factors, which relate to the social expectations for appropriate behaviour and the system of sactions associated to them (while TPB focuses more on a rational calculation of costs and benefits, including rewards and punishments for behaviour, NAM considers the emotional motivations

to belong as more relevant in the internalization of social norms). The theory of norm–activation also outlines a series of steps to describe the process that lead from the activation of norms and behaviour, which include: activation of personal norms, followed by a feeling of obligation, defense and response. Personal norms are defined as expectations that individuals hold of themselves, which are influenced by social norms, but also by personal and more general values that the individual holds and that are not dependent on specific situations. The result of respecting or violating personal norms is either pride or guilt and self-deprecation.

Although the NAM does not include intentions as predeterminants of behaviour and tries to move away from rational choice models of cost-benefit calculations, it also assumes that individuals are utility maximizing, in the sense that that weigh the costs of taking altruistic action against the moral costs of not taking it. The theory purports that if the costs are equally high, individuals are more likely to use psychological defence strategies to reduce cognitive dissonance, while if feelings of moral obligation are intense enough to outweigh other costs of action, then norm activation leads to action. Similar to the TPB, relationships described by the norm-activation theory have been tested in many studies, but a recent meta-analysis pointed out that very few studies have tested the complete model (Turaga et al., 2010).

Value-Belief-Norm Theory (Stern, 2000)

The Value-Belief-Norm theory integrates the norm activation model of Schwartz (1977) and the new environmental paradigm of Dunlap and Van Liere (1978) and proposes that values, beliefs about the relationship between humans and the environment, awareness of consequences and ascription of responsibility would lead to the activation of personal norms

which in turn would lead to pro-environmental behaviour. An important contribution of this framework is that it also defines four classes of environmentally significant behaviours, defined on two dimensions: whether they are public or private, and whether they are active or non-active pro-environmental behaviours.

1) Environmental activism: demonstrations, organizations, lobbying, which are public and active types of behaviour;

2) Public non-active behaviours: policy support and environmental citizenship behaviours, such as donations;

3) Non-public environmental behaviours : consumer purchases, use and disposal of household products, which entail everyday choices and routines

4) Behaviour in organizations, referring to how individuals perform jobs and how they behave in organizations.

Empirical research has provided support for the VBN theory (e.g., Nordlund and Garvill, 2003; Oreg and Katz- Gerro, 2006; Steg, Dreijerink, and Abrahamse, 2005; Stern et al., 1999). For example, Stern et al. (1999) found that VBN variables accounted for19.4% of the variance in self-reported consumer behaviour. These variables also accounted for over 30% of the variance in environmental citizenship and policy support (which was labelled *willingness to sacrifice* in the study). Propositions concerning the effects of values, environmental worldviews, and awareness of adverse consequences on one another were also supported. Moreover, Stern et al. (1999) found that VBN variables were better predictors of self-reported consumer behaviour, environmental citizenship, and policy support than were variables from

three alternative explanations for pro-environmental consumer behaviour (i.e., cultural theory, post-materialism, and belief in the sacredness of nature). However, similar to NAM, few studies have provided a simultaneous test of all of the variables included in the VBN theory (Steg *et al.*, 2005). Again, empirical studies confirmed many of the relationships among variables, but only a few studies tested the full set of causal relationships. Studies tested both the direct influence of values, as well as their indirect influence through beliefs about the negative consequences of human behaviour on the environment (Turaga et al., 2010). Furthermore, studies have looked at the relationship between values, the new environmental paradigm (NEP) and pro-environmental behaviours, finding that basic values shape NEP attitudes, with altruistic and biospheric values being positively related to an ecological worldview, while the egoistic and traditional values have a negative relationship (Stern, Dietz and Guagnano, 1995; cf. Turaga *et al.*, 2010). The overall model however has not necessarily been confirmed in studies and has been considered to be underspecified, although confirmatory structural equations modelling analyses have shown a good fit of the model to the data (Kaiser *et al.*, 2005).

One of the main limitions of both the NAM and the VBN is that they tend to be more useful in explaining low-cost pro-environmental behaviours and have far less explanatory power in situtions characterized by either high costs or strong constraints on behaviour (Steg and Vlek, 2009). As high-impact behaviours normally involve higher behavioural cost (e.g. mobility-related behaviours), and situations of significant lock-in, it has been suggested that behavioural change interventions should combine and align different types of incentives that include a focus on both self-interest and moral motivations for pro-environmental behaviour

(*Turaga et al.,* 2010).

Comparative testing of the models

In terms of testing the predictive value of these theories, Steg et al.'s proposal of an integrated framework has suggested that the norm activation theory (that focuses on normative considerations) is probably more predictive of behaviour when normative goals are focal, while the theory of planned behaviour which focuses on individual cost benefit analyses; Ajzen, 1991) might provide better explanations for behaviours for which gain goals are focal. Finally, theories focusing on affect are likely to be more predictive of behaviour when hedonic goals are dominant (cf. Lindenberg and Steg, 2007). They suggest that instead of changing factors related to the costs and benefits of behaviour, it might be more worthwhile to study effective ways of strengthening values and to understand how different situational cues activate or deactivate them in different situations.

Another attempt to indirectly test the postulates of the different theories belongs to Hunecke et al. (2001). They have tested a modified version of the norm activation model by introducing a measure of ability to perform the specific behaviour, or what was called perceived behavioural control by Ajzen. They also attempted to test the role of external factors that had an influence on the costs of the behaviour on the activation of personal norms. They test two different models that postulate an interaction between internal and external factors on behaviour: the "low-cost hypothesis" of Diekmann and Preisendorfer (1998) and the A-B-C model of Guagnano et al. (1995).

The "low-cost hypothesis" postulates that the influence of pro-environmental attitudes on environmental behaviour decreases proportional to rising behavioural costs. However, the authors did not propose a-priori criteria for determining high and low-cost behaviours, and they only did so after obtaining the results, which renders their argument rather circular (Hunecke et al., 2001). Guagnano et al. (1995), on the other hand, propose that the maximum influence of attitudes on behaviour is likely to occur at a medium intensity of external situational conditions. They came to the conclusion that Schwartz's norm activation model does not possess sufficient explanatory quality in behavioural settings characterized by strong constraints on behaviour (high-cost situations). It is only when medium external costs are present that would exert their maximum influence on behaviour.

In an experimental study, Hunecke et al. (2001) manipulated the external behavioural costs in a 2*2 factorial design, in which both distance to a subway station and the cost of travel were manipulated, generating high, medium and low-cost behavioural situations. One of their most significant results is that personal norms influence travel choice mode in both high cost and low cost situations and no interaction was found between personal norms and external factors. Their results thus reject both the "low-cost hypothesis" and the ABC model. They have shown that personal norms affect behaviour together with relevant external costs that personal norms are influenced especially by awareness of consequences and that social norms affect both personal norms and behaviour directly. However, the influence of social norms overall is lower than the influence of personal norms. Another significant result is that a latter evaluation has shown that the choice of public transport had been maintained over time by a part of the sample, even when external costs became higher, due to withdrawing of the free

ticket for the subway. It seems that exploring alternatives and becoming aware of one's choice can by itself have a positive effect on behaviour.

Another attempt to comparatively evaluate the explanatory power of different theoretical models for car use has been done by Bamberg and Schmidt (2003). They compared Ajzen's theory of planned behaviour (1991), Schwartz's model of norm-activation (1977) and Triandis's theory of interpersonal behaviour (1977) and proposed an integrative model for explaining car-use behaviour. Their results show that the TPB together with habits and role-related beliefs provide a good predictive model of car-use behaviour. Their integrated model explains 68 % of the variance in intention and 52 % in the variance of car use. An important result is that personal norms are not statistically significant as predictors of car use, while social norms are, as car use is, according to the authors, a shared and socially supported behaviour. Schwartz's model was less predictive of car use behaviour than the other two models, which fared better. An interesting result of their study is that role beliefs have a strong effect on the intention to behave pro-environmentally.

Two questions have driven model comparisons in the field of pro-environmental behaviour: whether behaviour is driven by cost-benefit calculations or by normative considerations, with recent research arguing that the right question is under what conditions one or the other are more influential; and secondly, whether behaviour is conscious or automatic/habitual and under what conditions one or the other is more likely.

Recent reviews of the evidence

Several meta-analyses have been carried out in recent years with the aim of reviewing the

empirical evidence on the psycho-social determinants of pro-environmental behaviour. Meta-analyses are very interesting as they provide a clearer picture of the weight of empirical evidence in the field. We summarize the conclusions of the most interesting ones here.

Bamber and Moser replicated an earlier study by Hines, Hungerford and Tomera carried out two decades earlier, in order to evaluate the empirical evidence accumulated in the field on the psychosocial determinants of pro-environmental behaviour. After an extensive search for studies testing relationships that are postulated both by the TPB and the NAM, they performed a meta-analysis on a total of 46 studies and 57 original samples that were deemed as fitting the criteria set out for the study. They propose attitudes, perceived behavioural control, and moral norms as the three direct predictors of behavioural intention, which in turn predicts behaviour. Using a structural equations modelling technique for meta-analysis, they tested the proposed relationship in the theoretically developed model, which included 8 different psychosocial determinants of pro-environmental behaviour in total. Their results highlight the conclusions that can be drawn from the empirical evidence they reviewed, as follows: behavioural intention is the sole direct predictor of pro-environmental behaviour, explaining 27 % of the variance in it, with perceived behavioural control not being confirmed as a direct determinant of final behaviour; attitudes, moral norms and perceived behavioural control are confirmed as three independent predictors of behavioural intention, explaining an average of 52 % of the variance across the studies; feelings of guilt, social norms, internal attribution of causality and environmental problem awareness are all confirmed as significant predictors of the moral norms dimension, explaining 58 % of the variance in personal norms, on average; social norms are confirmed to be both direct and indirect (via guilt) predictors of

moral norms, and to also be associated with attitudes and perceived behavioural control; their results also support the role of problem awareness and its relationship to internal attribution, guilt, social norms and personal norms. The authors also indicate that results confirm the view of pro-environmental behaviour as a result of considerations of self-interest and altruistic motivations, describing behvioral intention as a weighed balance of information on questions regarding three different aspects: positive and negative personal consequences of behaviour; evaluation of the cost/difficulty of behaviour; and existence of reason that might indicate a moral obligation for performing the pro-environmental option.

However, as the authors themselves note, studies have been more successful at explaining behavioural intention then actual behaviour. Where they do contribute to the explanation of actual behaviour, studies have also been noted to be more effective at explaining low-cost behaviours than difficult (and normally more high impact) ones (Steg and Vlek, 2009). Furthermore, a constant of the research on all three theoretical models suggest that while relationships among variables tend to be supported for a variety of low-cost pro-environmental behaviours, empirical tests of the whole models are hard to be found, making it difficult to extract conclusions on their overall utility. Also, different basic assumptions about motivations for human behaviour underlie each of the models, and integration of different motivational elements, such as the one proposed by the Value-Belief-Norm Theory seem most promising.

1.2.3 Pro-environmental behaviour in the workplace

Corporate greening behaviours have been defined as the changing of environmental practices to more environmentally friendly ones (Ramus and Kilmer, 2007). In the management literature, they have been considered behaviours that create value by lowering expenditures or improving the organization's reputation. At the level of organizational behaviour as a whole, they are normally undertaken by managers as part of their core organizational, or corporate social responsibility strategy. While these actions have for a long time meant the greening of production processes and the increases in the energy efficiency of organizational infrastructure and technology, it is more recently that they started to include workers´ pro-environmental behaviours.

Although household research has shed light on the determinants of pro-environmental behaviour, it has been noted that translating findings to a workplace context is not easy due mainly to two reasons: first, costs associated to non-sustainable behaviour are different in the household and in a work context (Siero et al., 1989), and secondly, an organization's size, structure, goals, culture and other organizational factors will generate a set of contextual conditions for pro-environmental behaviour that are very different from those present in households (Lo et al., 2012b).

Several classifications of voluntary pro-environmental behaviour in organisations have been proposed. Lulfs and Hahn (2013) consider two categories: direct behaviour targeted to an area of environmentally-relevant behaviour, or indirect actions that constitute enablers of such behaviour (e.g.: making suggestions for improving environmental practices of the organization; identifying technical malfunctions with significant environmental impacts or question environmentally-harmful organizational practices). Other authors consider two types

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of pro-environmental behaviour: those acts that are undertaken as part of the tasks the employees are normally carrying out (e.g. trying to use less paper when performing regular job-related tasks) and behaviour performed outside the formal duties and responsibilities defined by the job (Ones and Dilchert, 2012).

It has been noted that while individual pro-environmental behaviours are undertaken entirely voluntarily as part of one´s personal life, employee green behaviours always involve some degree of organizational oversight (Ones and Dilchert, 2012). However, they are normally not recognized by corporate reward systems due to the fact that they are not part of job descriptions (Lulfs and Hahn, 2013), and thus tend to be de-centralized and unstructured (Boiral, 2009).

A more recent conceptualization of pro-environmental behaviour in the workplace includes this type of behaviour within the category of organizational citizenship behaviours, defined as "discretionary acts by employees within the organization not rewarded or required that are directed toward environmental improvement" (Daily et al., 2009, p.246). Research on these types of behaviours has conceptualized three categories of OCBEs: eco-helping, eco-civic engagement and eco-initiatives. Eco-helping refers to voluntary willingness to help colleagues integrate environmental concerns into their work; eco-civic engagement reflects voluntary participation into the environmental activities of the organization and eco-initiatives involve suggestions to improve environmental practices in the organization. This categorization mirrors, to some extent, the division of private sphere pro-environmental behaviour from passive/non-commital to active and committed involvement, in that it groups behaviours in

categories that go from less personal costs (e.g.: eco-helping) to those involving higher costs, such as eco-initiatives.

Eco-initiatives are defined as creative suggestions from individuals or teams of employees that have the potential to improve an organization's environmental performance (Ramus and Kilmer, 2007). They tend to be considered marginal to an organization´s core business by managers and thus rarely systematically encouraged, also because encouraging them is considered time consuming and complex (Ramus and Kilmer, 2007). As a consequence, they are performed only in ´weak´ situations, defined as those situations in which individual predispositions are more important than context as drivers of behaviour, as compared to strong situations in which behaviour is driven by formal rules and norms (Schamir et al., 1993). Ramus and Kilmer (2007) consider four motivational factors that are drivers of extra-role prosocial behaviours in weak situations, and use them as a starting point in constructing a conceptual model to explain pro-environmental extra-role behaviours in the workplace: supervisory support; social norms; personal predispositions, and self-efficacy.

Besides pointing to a continuum of pro-environmental behaviour that can be carried out in the workplace, from low-effort/passive to high effort/pro-active, these definitions and classifications also point out to the importance of defining contextual boundaries of behaviour, as well as the level of constraints inherent in the structuring of contextual conditions in the workplace. While the context of private sphere behaviour is more diffuse, contextual conditions in organizations are easier to map and an important first step in the analysis of pro-environmental behaviour has to do with the understanding of the degree of autonomy these conditions allow. Even the framing of how pro-environmental behaviour is

defined in organizational pro-environmental behaviour research stems from assumptions about relationships between workers and managers and the expectations related to the level of agency and autonomy workers can exhibit. Thus, in order to understand pro-environmental behaviour in organizations, an analysis of the contextual factors is first necessary.

Contextual factors in the study of pro-environmental behaviour in the workplace

The importance of contextual determinants of pro-environmental behaviour has been often signalled in the study of household or private sphere pro-environmental behaviour. Contextual conditions create opportunities and constraints for individual and collective pro-environmental behaviour and interact with individual and group-level psychological factors in promoting or hindering pro-environmental behaviour and lifestyle change. In recent years, it has even been suggested that individual level motivations are only important insofar as they are triggered by contextual factors, as reflected in the concept of ´nudging´ (Thaler and Sunstein, 2009). A call to integrate contextual conditions into psychological models has been repeatedly issued in environmental psychology, and these range from structural factors pertaining to characteristics of social, political and economic systems, to infrastructure/built environment-related characteristics, to embedded behavioural incentives and social processes of influence acting as key drivers of pro-environmental behaviour. However, very little research on contextual conditions influencing pro-environmental behavior in the workplace has been carried out from a psychological perspective.

Among the studied contextual influences, one can find existing behaviour-supporting infrastructure, such as recycling facilities, the quality of public transport, or the availability of

environmentally friendly products (e.g. Stern, 1999; Thøgersen, 2005; Steg and Vlek, 2009); pricing/costs (e.g., van Diepen and Voogd, 2001; Vining and Ebreo, 1992); social influences (e.g., community norms and expectations, behavioural modeling); external behavioural incentives (e.g., rewards); and structural higher-order factors such as legal requirements, compliance mechanisms, and governmental regulations (e.g. Stern et al., 1999; Thøgersen, 2005).

Organizations are important social actors for sustainability, embedded in social, economic, legal and political systems, and they are, at the same time, contexts for individual pro-environmental behaviour. In order to identify conditions that would enable pro-environmental behaviour in and by organizations, an understanding is needed of both factors that are external to the organization and that have an influence on the environmental commitment and greening efforts of organizations, as well as of internal characteristics that contribute to the creation of a more or less supportive environment for workers´ pro-environmental behaviour.

In a comprehensive analysis of factors influencing private organizations´ environmental performance, Etzion (2007) has looked at both external and organizational factors determining an organization´s environmental performance. Among the most important external factors, he lists regulations, demands of consumers or other relevant stakeholders and the self-regulation processes of the domain or industry in which the organization is situated. Furthermore, he divides organizational characteristics relevant for environmental performance in strategic attributes, which are those that can be consciously manipulated by the leadership and contingency attributes, which are less controllable. Among the strategic attributes he lists innovativeness, workforce perceptions, integration of multi-stakeholder perceptions and

knowledge and information flow. Workforce perceptions are considered very important in workers' behaviours in organizations, as well as personal congruence with organizational values.

Among the contingency attributes, he lists size (bigger firms face more pressures to act pro-environmentally, or to have good pro-environmental performance than smaller firms), slack (defined as a measure of resources in excess of those required to produce output, with environmental performance being worse at lower slack), focus on research and development and international scope as being correlated to environmental performance. The international scope is considered to be associated to higher environmental standards, with research being said to not have found extensive evidence of multinationals taking advantage of lower environmental standards in less developed countries. However, this rather blatant statement seems at odds with increasing evidence regarding companies´ performance in countries with less strict environmental regulations than European countries endorse.

Besides Etzion, other authors have tried to come up with a classification of organizational factors influencing organizational environmental performance on the one hand, and workers´ pro-environmental behaviour on the other. Lulfs and Hahn (2013), for example, have grouped organizational factors in: organizational culture and structure, implementation of environmental management systems, the introduction of organizational codes of conduct and guidelines; and the development of human resource programs to improve employees' environmental competencies.

When targeting employee behaviour, they point out that organizations have focused on formal structures such as appointing environmental officers and codes of conduct, technical changes,

and initiatives such as providing employees with information and educational training to act pro-environmentally (Lulfs and Hahn, 2013). Executive compensation and environmental targets for polluting industries have also been used, and schemes for rewarding lower-level employees for their environmental initiatives have sometimes been used (Brammert et al., 2012, cited in Lulfs and Hahn, 2013), in spite of the scientific evidence that rewards do not necessarily motivate employees to behave pro-environmentally. Some authors have also considered bottom-up pressure within the organization as a determining factor, as the organization might experience increased staff tunover due to a lower level of organizational loyalty and diminishing work satisfaction (Wilkinson, Hill, and Gollan, 2001). Employee empowerment is also mentioned as a relevant factor by some authors, as important aspects for corporate sustainability (Wilkinson et al., 2001).

However, research also indicates that organizational initiatives such as environmental management systems or codes of conduct have only a limited impact on corporate greening (Yin and Schmeidler, 2009) as these are perceived as ´greenwashing´. The existence of environmental policies and the appointment of an environmental coordinator were found to have a weak effect on undertaking environmental initiatives (Lulfs and Hahn, 2013). The involvement of superiors however has a larger effect on organizational pro-environmental behaviour (e.g.: Andersson et al., 2005; Ramus and Steger, 2000). Specific environmental task assignment together with control and monitoring by superiors also play an important role in pro-environmental behaviour. However, enforcing environmental policy is sometimes perceived as illegitimate by some workers, which can affect the effects of a given organizational intervention or policy.

Organizational attempts to reduce their environmental impact and address environmental problems to which their activities might contribute have been considered insufficient and there have been calls for the need to transform organizational culture in ways that support sustainability goals, as an effective pathway for transitions to sustainability. However, there is not much clarity on how organizational culture might change, and how a sustainability-oriented culture can be promoted (Linnenluecke and Griffiths, 2010).

The role of organizational culture and climate

There have been several attempts to describe the components of the loose concept of *organizational culture*, understood as a series of implicit aspects of organizations, including implicit rules, norms, ways of doing and relating. Some authors have considered corporate environmental performance and perceived supervisory support to be the observable aspects of organizational culture that could be integrated in psychological research to explain pro-environmental behaviour in the workplace (Tudor *et al.*, 2008; Linnenluecke *et al.*, 2009).

An attempt to operationalize the concept of organizational culture and analyze culture change for sustainability in organizations has been made by Linnenluecke and Griffiths (2010), who established a parallel between Schein´s three levels of organizational culture and the different levels of adoption of corporate sustainability. Schein (2010) proposed a conceptualization of organizational culture composed of three levels: the observable culture (visible organizational structure, processes and behaviours), values (explicit strategies, goals and philosophies) and underlying assumptions (formed by unconscious beliefs and perceptions that constitute the source of values and action). For corporate sustainability, the first level refers to the explicit

implementation of sustainability measures such as technical fixes to reduce negative environmental impact, integrating sustainability measures in employee evaluation, and training and education for employees. The second refers to the assumption of sustainability values as part of the organization´s explicit mission and authors also include here changes in employees´ values and belief systems. Finally, the third level in organizations would include a change in underlying or deep beliefs about the interdependence between organizational activity or economic activity and the environment (Linnenluecke and Griffiths, 2010).

Although the concept of organizational culture is diffuse, a general agreement is that organizational values and management ideology are important elements of organizational culture. Management ideology refers to a series of principles about the best way to run an organization, motivate employees and achieve outcomes, with some focusing more on tasks and others on process, for example. The above-mentioned authors used the competing values framework of organizational culture (Quinn, 1988) to analyze the relationship between organizational culture and corporate sustainability, which posits two important dimensions in the analysis of organizational culture: the internal-external dimension which refers to organizational focus, and more specifically, whether the organization is focused on its internal processes, or on the demands of its external environment; and the flexibility-control dimension, which reflects organizational preferences for higher degrees of structuring and coordination, or higher degrees of flexibility, which in turn result in different preferences for internal mechanism of organization. No organization adopts a pure model, but there tends to be a dominant culture. The figure 1.2.3.1 illustrates the four types of organizational culture on this model:
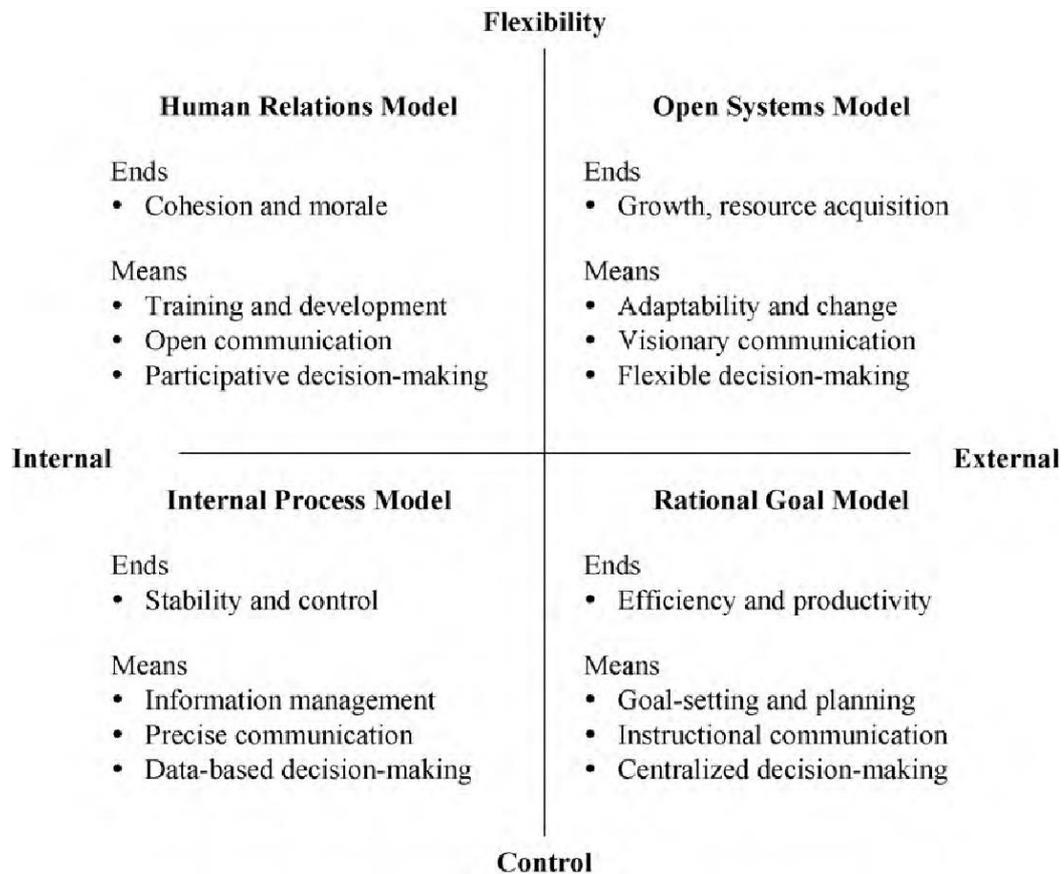
**Figure 1.2.3.1.** Competing values framework. Source: Adapted from Jones et al. (2005), by Linnenluecke and Griffiths (2010)

Each type of culture includes a set of valued outcomes and a coherent managerial ideology of how to achieve them. It is thus inferred that different organizational culture types influence how employees might understand and incorporate corporate sustainability (Linnenluecke and Griffiths, 2010).

Furthermore, the concept of organizational climate has been proposed as a factor influencing pro-environmental behaviour in the workplace. Organizational climate has been defined as the employees´ evaluations of tangible aspects of the work environment (James et al., 2008), and it is considered to be less stable than culture (Ashkanasy and Nicolson, 2003). Norton et al. (2014) have defined organizational climate as the employees´ shared perceptions about environmental policies, practices and procedures that are rewarded by the organization.

Employees are more likely to engage in pro-environmental behaviours if they perceive that their organization attributes value to the causes of environmental sustainability (Paille and Boiral, 2013). *Perceived organizational support* has also been found to be an important determinant of employee green behaviours, through the mediation of commitment to the organization and to be related to job satisfaction, which in turn leads to more citizenship behaviours (Paille and Boiral, 2013).

In terms of general organizational characteristics, a few qualitative studies have considered *organizational structure* and *organizational focus*, besides organizational culture, as important in the understanding of pro-environmental behaviour in the workplace (Tudor, Barr and Gilg, 2008; Lo *et al.,* 2012a). Finally, in a review of studies of organizational pro-environmental behaviour, Lo et al. (2012b) have proposed two other factors as especially important: *the involvement of superiors* and the *physical facilitation of behaviour*.

Social norms have also been considered a powerful influence of workers´ pro-environmental behaviour. Ramus and Kilmer (2007) have suggested that the behaviour of leaders and policy signals coming from top management levels might play a key role in the social norms that workers perceive. Other scholars have suggested that leaders' values and behaviours could

have a modelling role and this effect would cascade through the hierarchical layers of the organization (Antonakis and Atwater, 2002; cited in Ramus and Kilmer, 2007). Consistency between organizational norms and the employees' values and personal norms facilitates pro-environmental behaviour, while low-consistency situations do not. Individual motivations to engage in corporate greening behaviours are influenced by top management behaviour and environmental organizational policies (Ramus and Kilmer, 2007).

Besides the effects these organizational characteristics have on the performance of pro-environmental behaviour by workers, a recent study has also made the case for the effects that the adoption of environmental standards by an organization might have on labour productivity and the mechanisms that might explain such a relationship (Delmas and Pekovic, 2012). By using data from over 5.000 French firms, the study showed that the adoption of environmental standards increases employees´ social identification with their firm which in turn would increases labour productivity. A second mechanism through which the adoption of environmental standards influences labour productivity might be through changes in the organization including employee training and greater interpersonal interaction resulting in greater employee engagement. This study concludes that adopting environmental standards is beneficial for organizations in multiple ways, which is in line with arguments that defend the economic benefits of sustainability. This perspective has been criticized recently, however, for contributing to promoting the same logic that separates economic profit from environmental sustainability and considers the first to be a priority over the latter, and that is one of the main causes of human behaviour trends that have lead to resource depletion and climate change (Crompton and Kasser, 2010).

The role of leadership in the promotion of pro-environmental behaviour in organizations

Management is an important factor in organizations, as they have control over how organizations work (Blok et al., 2014). Different levels of management have different types of impact: top management is considered to be more influential on the overall environmental leadership of the organization (Subharabrata Bobby *et al.,* 2003), while middle-management is more influential in the employees´ attitudes and behaviour (Andersson et al., 2005).

Previous research has focused on the mechanisms through which leadership has an impact on the behaviour of individual workers. Three different mechanisms have been proposed for the influence of leaders on workers: as direct motivators of ecological initiatives in the workplace, through motivational appeals (Carrico and Riemer, 2011); through their role as relevant others and thus conveying social norms (Daily *et al.*, 2009); through conveying visible support to employees already carrying out pro-environmental initiatives, thus motivating others to follow (Lulfs and Hahn, 2013).

A study by Robertson and Barling (2013) found that the environmental descriptive norms that leaders uphold, together with their pro-environmental behaviour played a key role in the greening of organizations. This study also showed that leaders influence employees by sharing their values, by establishing a relationship with their employees, by providing intellectual stimulation and by being the source of inspirational motivation. Exemplary pro-environmental behaviour of leaders and leadership support of employees' pro-environmental behaviour have been tested in a study by Blok et al. (2014), which showed that these factors play a very important role in the pro-environmental behaviour of employees. They identify leaders´ descriptive norms as the main determinants of transformational leadership. They also

show that the effect of transformational leadership on individual behaviours is indirect and mediated by employee´s ´harmonious passion´ for the environment, a concept used by the authors to refer to positive emotions motivating individuals to act pro-environmentally, and is connected to employees´ value systems. The study concludes that seeing leaders voluntarily perform pro-environmental behaviours leads workers to infer that leaders hold pro-environmental values and that they consider such behaviours desirable, and it is these inferences that lead to the performance of pro-environmental behaviours.

Besides exemplary behaviour on the part of leaders, some authors have proposed direct and indirect reinforcement of workers´ behaviours as a potent motivator of pro-environmental behaviours (Brown et al., 2005). In a similar vein, others have suggested that organizational citizenship behaviours have a positive influence on the leaders´ assessments of workers´performance, and thus performing such behaviours becomes indirectly rewarded by leaders, with such rewards becoming motivations for pro-environmental behaviours (Organ *et al.*, 2006).

As the role of leaders, their values, behaviours and reactions to employee green behaviour has been shown to have high relevance in organizational processes of incorporating sustainability principles, Wesselink et al (2014) have sought to identify the core competencies of leaders that have a positive impact on processes of corporate greening. They started by presenting a set of core tasks that leaders must perform in order to implement corporate sustainability strategies. By analyzing multi-stakeholder projects, they identified four categories of tasks that managers perform:

- Orientation: e.g. analyzing systems, identifying consumer needs etc.

- Reaching common ground: initiating changes, building openness and trust etc.

- Performing pilot projects: e.g. knowledge sharing and integration, project management etc. and

- Embedding results: e.g. integrating approaches, marketing etc.

The competencies required for these tasks were identified as being: systems thinking, embracing diversity and inter-disciplinarity, interpersonal, action and strategic management. They also underline that learning these competencies requires discussion and feedback in an ongoing process within the organization.

Individual factors affecting pro-environmental behaviour in the workplace

The recent special issue of the *Journal of Organizational Behaviour* on 'Greening Organizational Behaviour' has pointed out that little attention has been paid in the literature to the intra-organizational and individual behaviours that may be relevant in corporate greening processes (introduction to the special issue, Andersson *et al.*, 2013). Individual behaviours contributing to the overall sustainability performance of organizations in particular have been researched much less frequently (Lulfs and Hahn, 2013), and it has been noted that studies often focus on the behaviours of top management (Lo *et al.*, 2012b).

Given that people spend a third of their average day in the workplace, it is rather striking that so little research has been conducted on this important life domain, especially given that some proof exists that reductions in organizational emissions can be achieved by behavioural measures alone (Dietz *et al.*, 2009). Furthermore, studies have shown that organizational measures targeting increases in environmental efficiency can be offset by employees´

wasteful behaviour (e.g. in energy-related behaviours, Sorrell and Dimitropoulos, 2008). Studies on organizational pro-environmental behaviour in the domain of energy have suggested that, to reduce organizational footprints, workplaces need to motivate their employees to curtail their direct and indirect energy use (e.g. by turning off unused appliances or printing less often, Bolderdijk *et al.*, 2013).

Motivating workers to act pro-environmentally requires a more general understanding of the drivers of pro-environmental behaviour in the workplace. Besides structural and organizational factors, reviewed so far, workers bring with them their own values, norms and motivations, which interact with organizational set-ups in determining certain behavioural outcomes. While individual factors influencing pro-environmental behaviour have been extensively studied in the household, this is not the case for organizational environments, where the interaction between structural and organizational constraints and opportunities, workers´ systems of values, beliefs, identities and motivations, and the social processes giving rise to particular organizational cultures and social norms need to be understood, in order to identify promising and flexible strategies to promote organizational sustainability in general, and pro-environmental behaviour among workers in particular.

The literature on personal antecedents of pro-environmental behaviour has revealed three categories of factors to be important: knowledge and awareness of environmental problems and solutions, including behavioural solutions; motivations to act pro-environmentally; and the abilities needed to do so. A review of these factors, with a special emphasis on the research carried out in organizational contexts, is presented below.

The role of knowledge in the performance of pro-environmental behaviour

A lot of research on, and interventions to promote, pro-environmental behaviour has focused on the role of knowledge of environmental problems and the behaviours that could be carried out to solve them. Environmental knowledge has been defined as one´s ability to identify a number of symbols, concepts and behaviour patterns related to environmental protection (Vicente-Molina *et al.,* 2013).

It is beyond debate that knowledge is a pre-condition of any behaviour, and that without awareness of the types of behaviours that can mitigate problems effective behavioural change is not possible. A recent meta-analysis, found that knowledge and environmental problem awareness are among the predictors of moral norms, together with attributions of causality and other factors, and thus are also indirect predictors of behavioural intentions (Bamberg and Moser, 2007). Lack of awareness of consequences of individual behaviours has been considered a major barrier to the uptake of sustainable behaviours (Hansla *et al.*, 2008). It is also clear that, as societal transition to sustainability entails the understanding of complex connections between different areas of behaviour carried out in different life domains, between consequences of different policies and behaviours, and between the intertwined nature of behaviours performed by a variety of social actors, necessary environmental knowledge becomes evermore complex and needs to be oriented towards understanding rebound effects, and the fact that reducing individual environmental footprint requires not only ´simple and painless solutions´ but drastic changes in lifestyles (Crompton and Kasser, 2010). Another implication of this complexity has to do with the fact that information required to carry out pro-environmental behaviour becomes overloading and it is very

difficult for individuals to manage all the necessary connections, thus requiring support to be incorporated in all everyday life contexts and environments. Although it is a necessary precondition for behaviour change, knowledge per se only contributes to raising people´s concern and awareness of environmental problems, but does not result in significant behavioural changes (Kollmuss and Agyeman, 2002; Bamberg and Möser, 2007).

Research on knowledge as a direct predictor of pro-environmental behaviour has yielded mixed results, with some studies finding no significant relationship between environmental knowledge and pro-environmental behaviour (Bartiaux, 2008; Laroche et al., 2001); others suggesting that deeper knowledge of environmental problems and their solutions increases the likelihood of individual action to protect the environment (Kaiser and Fuhrer, 2003; Kollmuss and Agyeman, 2002; Mobley et al., 2010), and still others showing that environmental knowledge has an influence on behaviour through the mediation of personal norms (Lulfs and Hahn, 2013, Bamberg and Moser, 2007).

In organizational contexts more specifically, several studies have looked at the role of knowledge and awareness as a determinant of employee pro-environmental behaviour. A recent study by *Lo et al.* (2012a) has shown that although employees of four different organizations (they included two private, one non-governmental organization and one university) were aware of the existence of an organizational sustainability policy, they did not think they had adequate information on the behaviours they could perform and their relevance in terms of environmental impact. This result shows the important role organizational communication on environmental issues might play in organizational transitions to sustainability. It is also interesting to note in the mentioned study that when discussing

attitudes and personal responsibility workers are of the opinion that nowadays everybody knows what to do for the environment, while when signalling the lack of organizational communication, employees underline the fact that there is a lack of awareness of the energy-related consequences of behaviours. The study´s results also show that feedback on personal behaviour is considered an effective communication strategy for awareness-raising and tailored feedback on energy consumption in the household has indeed proven to be effective in curtailing energy use behaviours (Abrahamse et al., 2007). One interesting conclusion is that employees tend to overestimate the importance of providing information, while research shows that information by itself is not sufficient to generate behaviour change (Lo et al., 2012a). This might be due to the individual tendency to the fundamental attribution error, which refers to the tendency to overemphasize the role of individual level factors on behaviour, and underestimate the role of contextual factors.

In the organizational context, Tudor *et al.* (2008) show that the level of pro-environmental awareness is an indirect predictor of sustainable waste management behaviour, while Gadenne *et al.* (2009) use environmental awareness as a predictor of environmental practices in small and medium enterprises. Other authors draw attention to the fact that environmental awareness might be more difficult to raise among regular employees compared to managers, as regular employees have a narrower perception of the overall environmental impact of the organization (Lulfs and Hahn, 2013).

Finally, some authors have looked at the practical and most effective ways of enhancing employees´ knowledge about environmental problems and organizational contributions to them, and found that these were: internal bulletins, environmental reports, dissemination of

the organization's environmental policy, and publication of environmental performance statistics (Boiral, 2009).

Motivations in pro-environmental behaviour at work

Motivation has been defined as a strong internal stimulus around which behaviour is organized (Wilkie, 1990). Motivation is therefore understood as a reason for behaviour, and it is characterized by intensity and direction (Moisander, 2007). A lot of research on pro-environmental behaviour has focused on the identification and role of motivational factors and has suggested that at least private pro-environmental behaviour can be understood as a mixture of self-interest and of concern for other people, the next generation, other species, or whole ecosystems (Bamberg and Möser, 2007). As the brief overview of most prominent environmental psychology theories has shown (see section 2.2.), among the most researched motivational factors for pro-environmental behaviours we find values, personal and social norms and, more recently, identity. Again, a brief overview of research on these dimensions is provided below.

Values as motivators of pro-environmental behaviour

Values have been defined as desirable goals that vary in importance and serve as guiding principles of people's lives (Schwartz, 1992). They are considered general antecedents of behaviour that transcend situations and exert an effect on a wide array of other both general

and specific behavioural antecedents such as beliefs, attitudes, norms, intentions and behaviours (Gardner and Stern, 2002; García-Mira et al., 2003). They are stable in time and change only under a limited number of life events or circumstances, with slight modifications occurring across the life span, as people pass through different stages. In his attempt to explain pro-social behaviour, Schwartz has defined two categories of values people can endorse: self-enhancement values and self-transcendent values. A lot of research has focused on the relationships between these two categories of values, behaviour and other determinants of it (good recent reviews of this literature are: Dietz, Fitzgerald and Scwom, 2005; Steg and De Groot, 2012).

Although they exert an important motivational force, they are also higher order cognitions that are derived from both internal determinants, such as psychological needs and drives, and external determinants, such as the social models and experiences people encounter (Crompton and Kasser, 2010).

A recent review has evidenced that both categories of values are related to environmental beliefs, attitudes, norms, intentions and actions. Four types of values have been identified in previous research: hedonic, egoistic, altruistic and biospheric, with the last two being considered especially important in understanding pro-environmental beliefs and actions (Steg *et al.*, 2014). This structure has been confirmed for many different cultures across Europe, Asia, Latin-America, and Africa (De Groot and Steg, 2010; Grønhøj and Thøgersen, 2009; Honkanen and Verplanken, 2004; Nilsson et al., 2004; Steg et al., 2011), and reflect different key concerns (Steg et al., 2011):

- Hedonic values reflect a key concern with improving one's feelings and reducing effort;

- Egoistic values reflect a concern for safeguarding or increasing one's resources;

- Altruistic values reflect a concern with the welfare of others;

- Biospheric values reflect a concern with nature and the environment.

Research on biospheric values considered to be the ones with most influence on pro-environmental behaviour has shown that these are endorsed all over the world and that they are a part of people's moral systems (Lindenberg and Steg, 2013). Other research has shown that biospheric values are related to sustainable consumption (Thogersen and Olander, 2002), preference for restaurants serving organic food (Steg et al., 2012) and acceptability of climate change policies (Nilsson et al., 2004).

As already mentioned, values are considered to affect behaviour through the action of more specific antecedents, such as behaviour-specific beliefs, attitudes, norms or identity. Steg et al. (2014) have proposed possible ways in which values affect pro-environmental behaviour: a) they affect the importance and perceived likelihood of different consequences of behaviour; b) they affect behaviour via norm-activation; c) they strengthen environmental self-identity, which in turn affects pro-environmental behaviour.

In their definition of an integrated framework for the promotion of behaviour change, Steg et al. (2014) summarize empirical research proof for each of the theoretical explanations mentioned above. Thus, for the first one, research has shown that values might direct attention to value-congruent information, which affects the forming of beliefs and behavioural choices individuals make (Nordlung and Garvill, 2003). People evaluate environmental and egoistic

consequences when they choose restaurants (Steg et al., 2014) or energy sources (Perlaviciute and Steg, 2014). People also seem to evaluate behavioural options in light of values (De Groot, Steg and Poortinga, 2013; Perlaviciute and Steg, 2014), by stressing any advantage and downplaying all disadvantages of behaviour options that are in line with their important values.

There is also evidence that the effects of environmental knowledge depend on the values people endorse. Environmental knowledge on the negative consequences of certain behaviours is increased by environmental campaigns, but it is only in the case of individuals with biospheric values that knowledge also leads to an increase of intentions to act pro-environmentally. Those endorsing egoistic values are not affected by an increase in their knowledge on the negative consequences of behaviour (Bolderdijk, Gorsira, Keizer and Steg, 2014). The importance of perceived consequences thus depends on the values endorsed.

The second theoretical explanation for the influence of values on behaviour contends that values influence behaviour through the activation of personal norms. Considerable cross-cultural evidence is also available for this relationship between values and personal norms, both for European countries and North America (De Groot et al., 2008; Nordlund and Garvill, 2002; Steg et al., 2005; Stern et al., 1999) but also for other regions of the world (Jakovcevic and Steg, 2013; Hiratsuka, 2010).

The third explanation contends that values affect environmental self-identity. Previous research has shown that values more strongly influence behaviour when the self is activated (Verplanken and Holland, 2002; Verplanken et al., 2009).

Besides the endorsing of one category of values or another, as stable predispositions toward certain behaviours, situational factors also have an effect on behaviour by either contributing to the activation of values through cues supporting them in the situations of choice, or contributing to less value prominence.

Research reveals, however, that biospheric values and normative considerations are less predictive of behaviours when these behaviours are too effortful, costly, or uncomfortable (Abrahamse and Steg, 2011; Bamberg and Schmidt, 2003; Diekmann and Preisendörfer, 2003; Steg et al., 2011). The explanation Steg et al (2014) provide for this result within their integrated framework is that biospheric values are pushed to the background as other values, such as hedonic ones, are threatened. In these cases, they suggest supporting pro-environmental behaviour by strengthening hedonic and gain goals but linking these to the environment.

In an attempt to formulate an integrated framework of pro-environmental behaviour, that would consider how individual psychological factors become activated by different situational cues and thus become salient, Steg et al. (2014) propose that purposive action is oriented by a set of goals that become prioritized based on situational cues. They contend that people have a preferred hierarchy of general goals, which derive from their endorsed values, but this hierarchy can be reversed or changed in contexts that trigger a different set of goals: hedonic and gain goals would describe a self-centered orientation and a motivational profile characterized by the seek for pleasure, while normative goals would describe a moral profile motivated by doing the right thing (Steg et al., 2014). The strength of goals driving a person's behaviour would depend, in these authors' conceptualizations, on personal values on the one

hand, and on situational factors that would influence the accessibility of values when a behaviour is performed.

If goals are a main motivator of pro-environmental behaviour, two different strategies can be envisioned for promoting pro-environmental behaviour: changing the actual or perceived outcomes of pro-environmental behaviour to reduce goal conflict on the one hand (either by reducing the perceived costs in time, effort, money or comfort, or increasing the perceived benefits), as well as the actual costs and benefits through policies or campaigns that would make environmental options for behaviour more attractive; or strengthening normative goals by emphasizing the moral component of pro-environmental behaviour and include cues to trigger moral goals in situations that entail behavioural choices that are environmentally-relevant. The authors also make a classification of the types of specific strategies that can be implemented based on the two possible pathways they define and of the conditions under which each of the two routes might be effective. Thus, reducing conflict between different types of goals might be useful when environmentally-harmful actions are much more attractive than the pro-environmental ones which would support people acting pro-environmentally even when hedonic or gain goals are central.

However, they draw attention to the existing risk of pushing normative goals to the ground if hedonic or gain goals are brought to the forefront, which might lead to unsustainable behaviour in other situations or areas of life. This would potentially lead to people endorsing a view that pro-environmental behaviour should be carried out when they are convenient or financially attractive (Thøgersen and Crompton, 2009), which can have the effect of "crowding out" intrinsic motivations for pro-environmental behaviour , an effect research in

behavioural economics has documented (Andreoni, 1990). When economic considerations are made salient in the context of an environmentally-relevant behaviour such as carpooling, it has been shown that they are less inclined to perform other pro-environmental behaviours, such as recycling (Evans *et al.*, 2013). Another environmental psychology study has documented this "crowding out" effect, by showing that when drivers received discounts when driving safely and environmentally-friendly (which could easily be conceived of as intrinsic motivations), they became less motivated to do so when the incentive disappeared and thus no stable behaviour changes could be observed (Bolderdijk et al., 2011). However, when normative goals are strong, people are less sensitive to effort, costs and benefits expected and that might be due to hedonic goals being weaker (Lindenberg and Steg, 2013).

The second route they propose entails strengthening normative goals, which emphasize moral considerations of doing the right thing. Many studies have shown that people act pro-environmentally even when behaviour is costly (Czajkowski et al., 2014), and have documented the connections between moral considerations and pro-environmental behaviour (recent examples include: Aquino, Freeman, Reed, Lim, and Felps, 2009; Bolderdijk, Steg, Geller, Lehman, and Postmes, 2012; Gärling, Fujii, Gärling, and Jakobsson, 2003; Haidt, 2007; or the meta-analysis of Turaga et al., 2010 who reviewed the evidence on rational choice versus moral motivation arguments in pro-environmental behaviour research).

Similarly, research suggests that people are more likely to adopt sustainable innovations when they believe that these innovations would benefit the environment and allows them to enhance their status, while instrumental costs and benefits did not significantly predict the likelihood of adopting sustainable innovations (Noppers et al., 2014). This was true for both products

(i.e., electric cars) and services (i.e., locally produced renewable energy). These examples suggest that acting pro-environmentally can serve both normative and gain goals. The authors also suggest that values may help us buffer situational cues that weaken normative goals, but they indicate that future research should analyze this hypothesis more in depth (Steg et al., 2014).

Similar to the value framework proposed by Schwartz (1977), recent work by Grouzet and colleagues (2005) across fifteen nations has documented the cross-cultural emergence of a set of life goals, across two distinct dimensions. Relying on a different theory of motivation, they propose that life goals can be differentiated, on the one hand, across an extrinsic-intrinsic dimension, which refers to either focusing on materialistic goals such as financial success, or status-related goals such as popularity, or affiliation, self-acceptance or community. On the other hand, goals can be differentiated on a dimension of self-enhancement or self-transcendence, similar to Schwartz´s theory of values, with the self-enhancement pole being characterized by hedonic goals, and the self-transcendent pole by spiritual goals, among others.

Quantitative empirical studies document that people who strongly endorse such self-enhancing, materialistic values also express more negative attitudes towards non-human nature. For example, Schultz and colleagues (2005) studied almost 1,000 university students from six nations and found that values for power and achievement were associated with viewing humans as consumers of, rather than part of, nature. Schultz and colleagues also reported that stronger values placed on power and achievement are associated with less concern about how environmental damage affects other humans, children, future generations

and non-human life. Where these self-enhancing values promote concern about ecological damage, this concern is limited to an egoistic consideration of how such damage might affect one personally (Crompton and Kasser, 2010).

In their integrated framework for pro-environmental behaviour, Steg et al. (2014) have suggested that strengthening normative goals should be a priority, as this will lead to pro-environmental behaviour being stable over time, and not dependent on external incentives and rewards. Furthermore, Crompton and Kasser (2010) have analyzed how attempts to emphasize gains from pro-environmental behaviour or the economic efficiency of pro-environmental policies might have rebound effects by actually strenghtening the lesser importance being given to pro-environmental goals and actions, as well as by incentivizing low-effort behaviours only and justifications for inaction.

In supporting more drastic changes in lifestyles, they suggest that long-term policy should place more emphasis on prioritizing intrinsic and self-transcendent values, in order to weaken the force of self-enhancing and extrinsic values. On these grounds, they perform a critique of a few organizational approaches to promoting sustainability, such as attempts to make the business case for sustainable development, paying for environmental services, supporting green consumption or the ideology of the three Ps in organizations (People, Profit and the Planet). Their critique is directed not only to government policies, but to the campaigns of environmental organizations themselves, which sometimes use these messages to draw attention to sustainability causes, and argue that these actually enhance selfish motives for behaviour, instead of weakening them. The business case for sustainable development carries implicit the assumption that the pursuit of environmental goals should be abandoned if it

comes into conflict with business interests, or when they depart from them. The policy of paying for environmental services suggests that combining market ideologies with sustainability goals is possible when economic value can be assigned to ecosystems, and this reinforces materialistic goals, by showing that financial interests should be considered more important than environmental ones. The three pillars of sustainable development give equal weight to social, economic and environmental outcomes, suggesting that economic outcomes can be pursued independently of social and environmental ones and should be balanced with the others. Finally, they argue that policies targeted at "buying green" reinforce the perception that the continued acquision of products can be reconciled with the efforts to solve environmental problems, while it has lately become clear that only less consumption would contribute to averting or diminishing the dramatic consequences of climate change.

Even in cases where intrinsic and self-transcendent values are endorsed, translating these values into behaviour is not always straightforward, given that our societal structures function according to a logic that did not consider the finite nature of environmental resources, or the possibilities of climate change. Both policy and environmental not-for-profit organizations can enhance the possibilities of acting on these values by providing contexts for social support (e.g. through supporting sustainable lifestyles initiatives etc). Organizations in general can support this by using implementation intensions, which have been shown to be effective in increasing compliance with speed limits (Elliott and Armitage, 2006), in decreasing the amount people drive (Eriksson et al., 2008) and in increasing people's use of both public transportation and stores that sell sustainable products (Bamberg, 2002).

Research on values in organizational contexts

Although values are often invoked in debates about corporate sustainability, and they are, as mentioned before, a key component of the concept of organizational culture, research on pro-environmental values in organizations is rather scarce. When they are brought into discussion, it is normally in reference to the values that leaders endorse, and rarely considered important in determining pro-environmental behaviours of employees. In the studies mentioned so far, only one empirical research article looked at the relationship between transformational leadership and worker behaviour, and considered workers´ values to mediate the relationship (Blok et al., 2014).

Attitudes have been studied more often as determinants of pro-environmental behaviour in organizations. They have been defined as an individual´s overall evaluation of behaviour (Eagly and Chaiken, 1993), and two components have been proposed for them: an instrumental component and an experiential one (Fishbein and Ajzen, 2010). A recent review of studies of pro-environmental behaviour in organizations found that, in general, attitudes correlate with behavioural intentions only moderately in organizations, and only weakly with specific behaviours (Andersson, Shivarajan and Blau, 2005; Scherbaum et al., 2008). The review also found that the findings regarding the relationship between beliefs and pro-environmental behaviours are not consistent. Most studies focused on recycling behaviour and correlations were again either moderate or weak (Tudor, Barr and Gilg, 2007; cited in Lo et al., 2012b).

Furthermore, the interplay between pro-environmental attitudes and affect has been explored in a study by Bissing-Olson et al. (2013). They have found both factors to have an important

role to play in pro-environmental behaviour at work. Interestingly, they have shown that positive affect in general had a high influence on the propensity to carry out pro-environmental behaviour at work. They also showed that the relationship between affect and pro-environmental behaviour was moderated by pro-environmental attitudes. Positive affect exerted a stronger influence on pro-environmental workplace behaviour for those people with less positive pro-environmental attitudes. As Andersson et al. (2013) noted, an important implication of this study is that employers can motivate employees' pro-environmental behaviour by both fostering positive affect and pro-environmental attitudes.

The study used a daily diary design to investigate relationships among the mentioned variables and considered two types of workplace pro-environmental behaviour: task-related pro-environmental behaviour (carrying out in-role tasks in environmentally friendly ways); and proactive pro-environmental behaviour (the extent the employee shows personal initiative when acting in environmentally friendly ways). Task-related pro-environmental behaviour was predicted by both daily un-activated positive affect and by pro-environmental attitudes, while activated positive affect predicted pro-active pro-environmental behaviour among employees with less positive pro-environmental attitudes, but not so for those with positive pro-environmental attitudes. The authors underline the importance of considering affect in explaining pro-environmental behaviour in the workplace and taking into account both activated and inactivated affective experiences.

Focusing on energy behaviour in the workplace, one qualitative study has tried to apply goal framing theory to look at three categories of motivations in carrying out pro-environmental behaviour in the workplace: gain, hedonic and normative. Among their important conclusions

we can find that gain motivations co-occur with normative and hedonic motivations more frequently than normative and hedonic motivations do. They also find that motivations are more homogeneous among employees of companies (gain) and NGOs (normative), than is the case for universities, where individual differences were largest and no distinct pattern could be found (Lo et al., 2012a). Lack of feedback and lack of financial incentives to save energy were found among the obstacles to carry out energy-efficient behaviour in the workplace.

Finally, an important result of this qualitative study is that although energy conservation is seen as good for reducing costs and achieve the objectives set by the corporate social responsibility strategy, it is seen as incompatible with optimal work quality and efficiency as well as with employees personal comfort, convenience and interest, thus suggesting that window-dressing policies will be accepted by workers and no additional efforts would be made to actually improve environmental behaviour in the workplace (Lo et al., 2012a).

The role of norms as determinants of pro-environmental behaviour

Social norms have been extensively studied in the field of social psychology and they have been shown to play a significant role in orienting individual behaviours, including environmentally-relevant ones (Cialdini, Kallgren and Reno, 1991; Cialdini and Goldstein, 2004, Stern, 2000). Social norms are defined as group-shared beliefs about rules or standards for appropriate behaviour. Littering behaviour studies carried out by Cialdini and colleagues (1991) distinguished between descriptive norms, defined as an individual´s perception of what the majority does in a given situation, and injunctive norms, defined as the perception of what

others think is appropriate behaviour and should be done in a given situation (Schultz, Khazian, and Zaleski, 2008). This distinction is based in part on studies of social influence and group conformity carried out in the 50s by Deutsch and Gerard (1955), which showed that individuals conform to norms for two different reasons: either because they extract information about what is normal or appropriate behaviour in a given situation, and thus act on the need to have an accurate view of the situation; or because they extract normative information, about what is needed to be accepted or liked by a group. Cialdini and colleagues suggested that injunctive and descriptive norms affect behaviour in different ways: injunctive norms motivate behaviour in order to obtain social approval and/or avoid social blame, while descriptive norms affect behaviour through the information they convey about what is the adaptive behavioural option in a given situation. Norms promoted by in-groups, or groups with which the individual identifies are likely to promote stronger behavioural modification (Terry, Hogg and Mckimmie 2000).

Furthermore, some studies have shown that sharing the same everyday life places, even in the case of sharing them with unknown others, can be a source of normative influence (Goldstein et al., 2008; Keizer et al., 2010; Nigbur et al., 2010). Place-related norms have been called "*local norms*" (Carrus, Bonnes, Fornara, Passafaro and Tronu 2009; Fornara, Carrus, Passafaro and Bonnes, 2011) since they refer to that kind of social influence stemming from the association between a specific behaviour and the specific every day life setting where such behaviour occurs. This place-dependent feature is what distinguishes local norms from general social norms or personal norms, which are considered to transcend specific places and be influential in several different places and life contexts. In fact, previous studies have shown

that the individual choice of behaving pro-environmentally is also affected by the perception that such behaviour is widespread among those who share a given every-day spatial-physical setting at a micro-scale level, that is by descriptive local norms (e.g., Keizer, et al., 2010; Nigbur et al., 2010; Fornara et al., 2011).

Social norms are perceived to be enforceable through reward or punishment (Thøgersen 1999). The focus theory of normative conduct proposes that norms are only going to influence behaviour when they are focal and when they are salient in a given situation (Cialdini, Reo, Kallgreen, 1990). Situational cues of norm respect or violation are key influences on behaviour, as they reduce the strength of normative goals (Keizer, Lindenberg and Steg, 2014). Cues showing disrespect for the norms will weaken injunctive norms but also behaviour not directly related to the norm. This was called a cross-norm inhibition effect and certain conditions have been shown to produce this effect: when transgressors increase in number (Cialdini et al., 1990); when transgressors are similar (Gino, Ayal and Ariely, 2009); and finally when the status of transgressors increases (Keiser, Lindenberg and Steg, 2014).

Research explicitly designed to test the focus theory of normative influence has provided support for its central postulates by demonstrating (a) that norms guide action directly only when they are focal (Kallgren, Reno, and Cialdini, 2000) and (b) that activating one or the other of the two types of norms produces significantly different behavioural responses (Cialdini et al., 2006).

Research often finds that descriptive and injunctive social norms are positively correlated (Cialdini, 2003), suggesting that the differentiation between them is sometimes hard to make. Furthermore, research on pro-environmental behaviour that includes both social and personal

norms, tends to show that the direct effect of subjective norms on pro-environmental behaviour dissapears when personal norms are accounted for, with a few exceptions (Thogersen, 2006). Thus, a different taxonomy of norms was proposed, based on principles of self-determination theory for the regulation of behaviour. Self-determination theory (Ryan and Deci, 2000) provides an explanation for the internalization of social morality principles. Following this theory, Thogersen has proposed a new taxonomy of norms, based on the level of internalization of social influence, which thus poses social and personal norms on a continuum from lesser to higher degrees of internalization. Three categories of injunctive norms are proposed: external norms, which are the equivalent of social norms, personal norms enforced by anticipated guilt as a distinct subtype of internalized norms, called introjeted norms, in which reinforcements originate within oneself, and finally integrated norms, which involve a higher level of internalization and thus reflexive allignment between personal norms and the system of values and beliefs the individual endorses. Higher degrees of norm internalization are likely to lead to less ambivalence towards norm compliance (Thompson et al., 1995). Thogersen (2006) finds that for all types of pro-environmental behaviour with the exception of separation of compostable kitchen waste, integrated norms are the ones exhibiting the strongest correlation with behaviour. Also, except for the use of public transportation, descriptive norms are more strongly correlated with behaviour than subjective social norms. However, the author concludes that although integrated norms are the strongest predictor of pro-environmental behaviour, introjected and descriptive norms also add to the prediction of behaviour. Furthermore, descriptive norms have a direct effect on behaviour, as they capture non-injunctive normative influence, and have a relevant effect on all behaviours with the exception of choice of transportation.

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Various studies have shown a positive correlation between pro-environmental behaviour and personal and social norms (Bamberg and Schmidt, 2003; Bratt, 1999; Fornara et al., 2011; Harland et al., 2007; Matthies et al., 2012; Ramayah et al., 2012; Stern et al., 1999; Thøgersen 1999).

Studies testing interventions based on normative influence in different settings have demonstrated their effects on pro-environmental behaviour. For example, a study by Schultz (1999) found that households that received descriptive normative information increased both the amount and frequency of their subsequent recycling behaviours. Another study found similar results in a hotel setting where normative messages increased towel reuse by more than 28% (Goldstein, Cialdini, and Griskevicius, 2008).

Personal norms are defined as feelings of moral obligation (Schwartz, 1977). They are inner moral convictions that are defended irrespective of the expectations of others. They can also be defined as one's own beliefs on how to act. Norm-activation theory, which posits personal norms as the main antecedent of pro-environmental behaviour, has defined personal norms as "self-based standards for specific behaviours generated from internalized values during the process of behavioural decision-making" (Schwartz and Howard, 1981: 192). Besides internalized values, it is considered that personal norms are influenced by social norms. Personal norms have been related to different types of pro-environmental behaviour such as energy conservation (Black *et al.*, 1985), recycling (Guagnano *et al.*, 1995), travel mode choice (Hunecke *et al.*, 2001), and pro-environmental buying (Thøgersen, 1999). However, when personal norms are included in models, the direct influence of social norms becomes

smaller (Thøgersen, 2006; Klöckner and Blöbaum, 2010; Klöckner and Oppedal, 2011), which means that social norms become included into personal norms.

Normative influence in organizations

A few studies have conceptualized or looked at the role of social and personal norms in organizational pro-environmental behaviour. Several organizational studies consider personal predispositions to play a key role in explaining pro-environmental behaviour in companies (Ramus and Klmer, 2007; Scherbaum et al., 2008; Tudor et al., 2008; Gadenne et al., 2009). Personal norms however have been systematically included very rarely (Lulfs and Hahn, 2013). A study investigating the individual and contextual influences shaping the environmental decision intentions of managers in the US metal-finishing industry is one exception (Flannery and May, 2000). This study showed that the magnitude of consequences, considered to be a dimension of moral intensity, moderates the relationships between five other individual antecedents and intentions for ethical environmental decision-making of managers. The five measured antecedents were: attitudes, subjective norms, and 3 perceived behavioural control factors (self-efficacy, financial cost, and ethical climate).

Personal predispositions in general are considered to be particularly important for discretionary and voluntary behaviour in organizations (Tudor *et al.*, 2007; Daily *et al.*, 2009). Starting from this premise, Lulfs and Hahn propose an integration of TPB and NAM in the explanation of voluntary pro-environmental behaviour in organizations. They note that only very little previous research has looked at individual predispositions as determinants of pro-environmental behaviour, due to the high influence attributed by scholars to contextual

influences. They also argue that an adequate model for the explanation of pro-environmental behaviour in organizations needs to include, besides theTPB, personal norms and habits and propose an integrated framework for determinants of individual voluntary pro-environmental behaviour, but without providing an empirical test for it. The theory of norm activation has rarely been tested in an organizational context, in spite of the fact that some studies have identified individual concern (Bansal and Roth, 2000) and personal norms and values (Vazquez Brust and Liston-Heyes, 2010) as drivers of sustainability.

Some interventions based on normative influence have been tested in organizational contexts. For example, a study by Siero et al. (1996) showed that mail-van drivers adopted a more fuel-efficient driving style when they received feedback that related their van´s weekly fuel use to that of co-workers.

Other studies have looked at motivation of energy conservation behaviour on the workfloor, which has been found to be a rather challenging task (Scherbaum, Popovich, and Finlinson, 2008; Staats et al., 2000; Carrico and Riemer, 2011). The provision of feedback regarding personal energy use, especially when presented comparatively to the performance of co-workers, has proven effective (Ayres and Warr, 2009; Nolan et al., 2008; Siero et al., 1996). Installing smart meters has been proposed as a solution to provide feedback to workers about the effect of their energy conservation behaviours, together with behavioural incentives, which can act both as direct influences on energy-related behaviour, as well as indirectly through the diminishing of privacy concerns (Bolderdijk et al., 2012).

Studies on personal norms in organizations show stronger correlations between this construct and behavioural intention when referring to a specific domain such as recycling or energy

conservation, and are only moderately correlated to behaviour (Lulfs and Hahn, 2013). Both managers´ and co-workers´ pro-environmental expectations are relevant in the study of pro-environmental behaviour in organizations.

The role of identity as antecedent of pro-environmental behaviour

Our identity serves both to differentiate oneself from others and to conform to the values, beliefs and behaviours of the social groups to which we belong (Christensen et al., 2004 in Whitmarsh and O'Neill, 2010). Personal identity refers to our self-definition in terms of personal attributes, whereas social identity refers to self-definition in terms of relevant social categories, such as nationality, ethnicity, gender, or sexual orientation. Whereas the personal self is defined as a unitary and continuous awareness of who one is, the social self can be as varied as the groups to which we belong. Each of us has a range of different social identities and, as a consequence, we have different perceptions of ourselves and others depending on which identity is most salient at any given time (Ellemers *et al*, 2012). Although people have an awareness of a self that is separate from the social categories to which one belongs, the process of self-definition is rather more intricate, as our personal attributes are originally derived from our categorization as members of social groups.

Identity is generally defined as the label we use to describe ourselves (Cook *et al*., 2002). Environmental self-identity is defined as the extent to which a person sees herself as a pro-environmental person (Van der Werf, Steg and Keizer, 2013; Whitmarsh and O'Neill, 2010). Identity is influenced by both personal motivations and social expectations and demands, and it serves both functions of differentiation and conformity (Christensen et al., 2004).

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Several studies have investigated the relationship between identity and behaviour. Some studies have shown that self-identity predicts behaviour better than traditional variables included in the theory of planned behaviour, in the case of recycling behaviour, for example (Mannetti, Pierro, and Livi, 2004).

Research on place identity, for example, showed that this type of identity is related to attitudes and behaviour involving protection of local areas, neighborhood revitalization efforts and a desire to maintain closeness to given places (Devine-Wright, 2009, Hidalgo and Hernandez, 2001, Moser et al., 2002). Furthermore, a study by Sparks and Sheperd (1992) found that people who consider themselves to be "green consumers" are more likely to buy organic food than those who do not, irrespective of past behaviour.

Identity can operate at two different levels: generic and specific (Whitmarsh and O´Neill, 2010). At a generic level, identity can be related to a set of connected pro-environmental behaviours, such as a "green consumer", or being "green" in general. At a specific level, identity is a domain-specific label, such as being a typical recycler (Mannetti et al., 2004). A review of the literature on identity by Crompton and Thogersen (2009) suggested that specific identities might explain persistence in performing a specific behaviour across different contexts, while general-level identities might explain spillover among different categories of behaviour. Previous research has proven both levels to have an impact on pro-environmental behaviours. At a general level, green self-identity has been related to ecoshopping, waste reduction, water savings and domestic energy conservation (Whitmarsh and O´Neill, 2010), and environmental self-identity has been shown to influence recycling, buying fair trade products and deciding not to fly on holiday (Gatersleben et al., 2012). At a specific level,

recycling self-identity was related to recycling behaviour (Nigbur *et al.*, 2010), and having an identity that includes genetically modified food was found to be related to the intention to purchase this type of food (Cook *et al.,* 2002).

Some studies have differentiated between two different understandings of environmental identity: one, labelled environmental identity, reflects the degree to which one sees oneself as part of nature, while the other, labelled environmental self-identity has been defined as the view of oneself as a person who acts pro-environmentally (Van der Werf *et al.*, 2013).

Identity is also influenced by our past behaviour. Reminding people of previous actions has been proven to have an effect on the strength of their identity (Cornelissen, Dewitte, Warlop, and Yzerbyt, 2007; Cornelissen, Warlop, and Dewitte, 2008).

Besides integrating identity into TPB models, research has related identity to values and norms, thus attempting to include this factor into moral theories of pro-environmental behaviour such as NAM or VBN. A relationship was established beween values and identity (Crompton and Kasser, 2010; Verplanken and Holland, 2002). A study by Van der Werff, Steg and Keizer (2014) tested the relationship between biospheric values, environmnetal self-identity and behavioural preferences, intentions and behaviours and showed that biospheric values explained 25 % of the variance in energy-saving self-identity. Both were then significantly related to intentions to save energy, on the one hand, and energy-related actions, on the other. They also found that energy-saving self-identity mediated the relationship between values and energy behaviours. They tested this relationship for meat consumption, showering and driving, all constituting energy-intensive behaviours. Energy-saving self-identity was also a mediator of the relationship between values and intentions to reduce

energy. They also tested the relationship between general environmental self-identity and biospheric values, as well as the relationship of these with a range of pro-environmental intentions and behaviours. Environmental self-identity again mediated the relationship between values and behaviours, intentions, and willingness to pay or switch to green energy. They conclude that both values and environmental self-identity can be considered general antecedents of environmental preference, intentions and behaviour. Self-identity might also be predicted by other general antecedents such as environmental concern (Van der Werf *et al.*, 2014).

The role of identity in pro-environmental behaviours in the workplace is more complex. Besides environmental self-identity, it is likely that behaviour in organizations will be influenced by how employees perceive organizational identity (whether the organization is a "green" one), and by the level of organizational identification that employees experience. Also, in organizations, employees are assigned roles that are sometimes conflicting, or that come into contradiction with parts of the organization´s culture. A study of sustainability managers and consultants showed that their displays of identity changed depending on the context: thus, in the presence of senior managers, they presented themselves as rational managers, while in the presence of like-minded colleagues they would assume the role of change agents towards sustainability (Wright *et al., 2012)*.

Previous research has suggested that employees can identify more strongly with ethical organizations, and this might result in cooperative and organizational citizenship behaviours (Jones and Hamilton Volpe, 2010) and higher employee organizational commitment (Brammer *et al.*, 2010; Peterson, 2004).

According to Albert and Whetten (1995), organizational identity has the following dimensions: employees´ perception of central organizational attributes; the perception of attributes making it unique as compared to other organizations; the perceived enduring characteristics of the organization, regardless of changes in the organization´s environment. These perceptions form the basis for the identification with the organization (Hatch and Schultz, 2000).

Organizational identification is defined as the perception of oneness with or belongingness to an organization (Mael and Ashforth, 1992) and includes three components: feelings of solidarity with the organization; attitudinal and behavioural support for the organization; and perception of shared characteristics with other organizational members (Patchen, 1970). It has been related to employee satisfaction, affective commitment, job involvement, organizational loyalty, work group attachment and extra-role behaviour and employee behaviour, as well as to the overall effectiveness of the organization (Albert *et al.*, 2000; Adler and Adler, 1988). Organizational prestige, organizational distinctiveness and social network size have been considered important antecedents of organizational identification (Jones and Hamilton Volpe, 2010).

As environmental self-identity has been proposed as one of the factors that might enhance spillover between different categories of pro-environmental behaviours, and different locations and life domains (Whitmarsh and O´Neill, 2010), it is interesting to understand how environmental self-identity might be enhanced. As mentioned before, past behaviour plays an important role in our self-identity, but only if behaviour is carried out voluntarily and perceived to be under the individual´s control. Thus, according to Ruepert *et al.* (2012),

employees´ environmental self-identity is most likely strengthened when they engage in autonomous pro-environmental behaviour at work, and not when this behaviour is strictly regulated by rules and procedures.

The role of ability in pro-environmental behaviour in organizations

The theory of planned behaviour postulated that three types of beliefs play a role in the weighing of behavioural alternatives and the forming of behavioural intentions to act a certain way: behavioural beliefs (attitudes towards a specific behaviour), normative beliefs (perceived expectations of others) and control beliefs (perceived possibilities to act). Thus, besides motivational factors such as attitudes and norms, the theory considers the perceived ability to act as a key determinant of behaviour, both directly, and indirectly, through the forming of behavioural intentions. This particular dimension reflects the interaction between individual psychological characteristics and contextual constraints and opportunities. As mentioned before, a meta-analysis of several studies including predictors of the TPB has confirmed the role of subjective behavioural control for carrying out pro-environmental behaviours (Bamberg and Schmidt, 2007), and several studies have confirmed its relationship to particular behaviours, such as recycling (Mannetti et al., 2004; Klockner and Oppedal, 2011). Another study found it to be a direct predictor of ecological behaviour in general (Kaiser and Gutscher, 2003).

Self-efficacy has been defined as a person´s evaluation of the level of personal resources, knowledge or skills to attain a goal (Bandura, 1997) or to perform a behaviour (Ajzen, 1991). It is considered a key aspect of a person´s sense of competence, related to a sense of personal

agency and self-worth or self-esteem (Bandura, 2000). In specific situations, self-efficacy reflects a perception of the person´s ability to act in a given way, considering perceptions of situational possibilities. Contextual factors, although constituting a set of objective limitations and opportunities, are also perceived differently by different people, depending of their individual characteristics, such as general sense of competence, motivations, and past experience.

Perceived behavioural control has been shown to predict intention to reduce energy use (Abrahamse, 2007), intention to reduce car use (Bamberg and Schmidt, 2003), bus use (Heath and Gifford, 2002), as well as pro-environmental behaviours such as the use of unbleached paper, the use of energy saving bulbs or the use of other modes of transportation other than the car (Harland et al., 1999). In terms of physical facilitation of behaviour, it has been considered a key factor in promoting sustainable behaviour, for example in recycling behaviour (Brothers, Krantz and McClannahan, 1994).

Although self-efficacy has been studied in relationship to a whole set of quantifiable behavioural outcomes, it has been noted that studies on its role for pro-social or altruistic behaviours that are not rewarded immediately or for which reward is more diffuse, are rather scarce (Tabernero and Hernandez, 2011). The relationship between self-efficacy and outcomes is well documented in the literature (Bandura and Locke, 2003)

An Italian study found that personal efficacy beliefs together with self-trascendent values explain a high percentage of the variance of pro-social behaviour. Self-tramscendent values influence behaviour either directly, or indirectly, through self-efficacy beliefs (Caprara and Steca, 2007).

A study by Tabernero and Hernandez (2011) investigated the relationship between self-efficacy and intrinsic motivation on pro-environmental behaviour, with intrinsic motivation being hypothesized as playing a mediating role between self-efficacy and pro-environmental behaviour. Their results show that individuals who experience higher levels of self-efficacy, tend to also set higher golas for themselves, feel more satisfied with their behaviour and experience greater intrinsic motivation. Using structural equations modeling, their results also evidence that pro-environmental behaviour is influenced by self efficacy, both directly, as well as indirectly, through the mediation of goal setting and intrinsic motivation, on the one hand, or levels of satisfaction, on the other. The tested model is very interesting for several reasons: first, it is one of the few in the literature that attempt to account for the factors explaining the relationship between self-efficacy and environmentally relevant behaviour. Secondly, it shows that self-efficacy predicts pro-environmental behaviour through the mediation of intrinsic motivation, showing that beliefs in the capacity to perform a certain action is related to higher levels of intrinsic motivation, which in turn leads to pro-environmental behaviour. Also, it is interesting to note that satisfaction is a predictor of pro-environmental behaviour, thus bringing furtehr evidence to the contention that intrinsic satisfaction that is anticipated when carrying out pro-environmental behaviours is a source of motivation, similar to the concept of "warm glow" in behavioural economics (Andreoni, 1990).

In a more recent study, Tabernero et al. (2015) have further proposed a multilevel model of waste management that included individual, collective and organizational factors in the explanation of recycling behaviour in municipalities of different sizes and characteristics.

Their results shed light, among other things, on the relationship between individual and collective self-efficacy and their relationship to recycling behaviour. Self-efficacy has a stronger relationship to behaviour in communities with weak community efficacy beliefs, and satisfaction with service quality is more strongly related to behaviour in communities with strong community efficacy beliefs than those with weaker beliefs and smaller populations.

It has also been recently suggested that self-efficacy might act as a coping strategy in the face of threat, aiming at reducing feelings of helplessness (Hornsey *et al.,* 2015).

Self-efficacy beliefs have been intensely studied in organizational contexts. They have been related to a wide range of organizational outcomes, and have been considered better predictors of performance than individual skill levels (Barling, 2014). Three factors are considered important in developing self-efficacy beliefs: personal mastery experiences, vicarious experiences and verbal persuasion, and some studies have argued that transformational leadership influences organizational outcomes through the mediation of employees´ self-efficacy beliefs (Strauss et al., 2009). Besides employees´ self-efficacy, leaders self efficacy beliefs are likely to engage in high quality leadership behaviours, commit more energy to their tasks and show higher levels of persistence in the face of challenges (Barling, 2012).

In a recent conceptual article, Lulfs and Hahn (2013) have proposed a model for the explanation of voluntary pro-environmental behaviour in organizations, in which they have included perceived behavioural control as a predictor. They consider perceived corporate environmental performance, as well as perceived supervisory support as further subjective contextual influences that should be included in the explanation of pro-environmental

behaviour in the workplace. Empirical studies relating self-efficacy beliefs to pro-environmental behaviour in organizations are not so common, however, and the few that have included these measures reveal a mixed pattern of results (Tudor et al., 2007; Cordano and Frieze, 2000). As past experience influences self-efficacy beliefs, it is worth mentioning that one study found a large effect of past experience with household recycling on office recycling behaviour (Marans and Lee, 1993).

Previous research has found that the type of employee is important in energy-use behaviours at the workplace. Top and middle management, for example, play a crucial role in organizational pro-environmental behaviour through the influence they have on employees (Ramus and Steger, 2000; Tudor, Barr, and Gilg, 2008). Their role has been extensively studied in multiple organizations (Branzei, Ursacki-Bryant, Vertinsky, and Zhang, 2004; Gonzalez-Benito and Gonzalez-Benito, 2006; Sharma, 2000). Furthermore, employees with specific environmental responsibilities such as environmental responsible managers or coordinators can have an important and distinct role in energy use in organizations (Scherbaum et al., 2008). Their role has been taken up in previous studies (Egmond, Jonkers, and Kok, 2006; Vermeulen and Hovens, 2006; Völlink, Meertens, and Midden, 2002). Finally, all other employees have a considerable influence on energy consumption in organizations through their day to day organizational behaviours and the constraints and influence they can have on managers and other environmental responsible persons in organizations, with relatively little studies looking at this particular group (Lo, Peters, and Kok, 2012b).

However, Ramus and Kilmer (2007) have considered two individual factors alongside organizational/contextual factors in their framework of determinants of corporate greening behaviours among employees. These were personal predispositions, and self-efficacy. As already mentioned, personal values, beliefs, attitudes and habits are considered especially important for extra-role behaviours in organizations, and there are some studies that have shown that employees values exert influence over an employee's motivation to act pro-environmentally at work (Cordano and Frieze, 2000; Egri and Herman, 2000). Self-efficacy was also considered an important individual factor influencing pro-environmental behaviours at work. Ramus and Steger (2000) demonstrated that building competence on environmental issues, which is likely to increase self-efficacy, is significantly related to eco-innovations. Ramus and Kilmer (2007) have thus also proposed a conceptual model that links contextual factors to individual variables to explain workplace environmental behaviour. Among contextual variables, they include support from supervisors and the organization (through social norms) and the individual variables mentioned above.

Towards comprehensive models of pro-environmental behaviour in the workplace
As stated before, although the study of pro-environmental behaviour in the household has intensified in the last two decades, which has led at a proliferation of empirical research on its determinants, using a variety of research methods from qualitative to quantitative and from correlational to experimental, interest into pro-environmental behaviour in organizations, and especially the pro-environmental behaviour of workers, is more recent. This mirrors, in part,

the fact that organizations have only recently become more seriously interested in developing policies and strategies to go beyond ´greenwashing´ and paying only lip service to corporate sustainability, with some attempting to promote a sustainability-oriented organizational culture and to promote voluntary pro-environmental behaviour among employees. This trend has not extended to a majority of organizations, however, and both private and public ones are lagging behind in achieving more ambitious culture change goals, as evidenced by the majority of empirical studies reviewed above. Secondly, attempts to go beyond what have become classical theories of determinants of pro-environmental behaviour, by incorporating different types of motivations, considering context-dependent or hierarchically-organized motivations, or systematically integrating contextual factors into predictive models of individual pro-environmental behaviours are also new for household behaviour, as the proposals for an integrated framework for pro-environmental behaviour using goal framing theory (Steg and Vlek, 2014) or attempts to comparatively review empirical evidence supporting either rational choice or moral motivation-based theories and propose integrated models have shown (Bamberg and Moser, 2007; Turaga, 2010). Thirdly, research on pro-environmental behaviour in organizations is not done in a highly systematic way, which makes drawing clear conclusions harder.

However, some attempts have been made to propose and test frameworks for the explanation of pro-environmental behaviour in the workplace, by either combining elements of the classical pro-environmental behaviour theories, or by including contextual/organizational and individual level factors as predictors of workplace behaviour. Studies have been done on all domains of behaviours considered for the present research as well (energy, waste management

and travel), although energy-related studies are more common. These exceptions are reviewed below.

A series of studies undertaken by Lo *et al.(2012a, 2013),* on energy and travel-related behaviour in organizations, have produced interesting results on the role of individual and organizational determinants on pro-environmental behaviour in the workplace, as well as their interplay. In a qualitative study of energy-related behaviours in office buildings from four organizations in the Netherlands, which included interviews and focus groups, the study showed that goals such as work efficiency and productivity were prioritized over energy conservation.

In terms of self-efficacy, they find that job responsibilities are considered a key element of what one can and should do and that responsibility is mainly attributed to facility managers and top managements, with general employees rarely approaching or influencing key actors. In terms of subjective norms, the study found that the behaviour of top management was viewed as crucial in encouraging behavioural change.

In terms of personal influence in office energy use, the study found that workers perceived this to be minimal. Workers also think a lot of energy is wasted through inefficient heating systems, considering the inability to regulate temperatures as a key obstacle. Regarding the behaviour of switching lights on and off, some employees mentioned leaving lights on during daytime to signal to others they were in the office, which illustrates the importance that perceived informal rules and social norms have on environmentally-significant behaviour at the workplace.

The general conclusions of the study were that workers underestimate the value of their behaviour on energy conservation, while managers see a high potential; that descriptive norms are crucial in complying with organizational policies; and that organizational interests other than saving energy were considered more persuasive (such as fire risks). Furthermore, work is seen as a primary interest and this confirms findings from a previous study which showed that motivations of employees for non-core work responsibilities and activities was low (Tudor *et al.,* 2008). Knowledge about energy saving behaviour and its consequences is perceived as very important, as it leads to a feeling of self-efficacy and poor organizational communication is perceived as a contributor to low self-efficacy. A general sense of uncontrollability is present, which has to do, according to these authors, with the division of responsibilities regarding environmental issues in the studied organization, which has also been signalled by previous studies (Andersson, Shivarajan, and Blau, 2005; Ramus and Steger, 2000; Tudor et al., 2007).

Another study on energy conservation in the workplace tested the VBN model in an organizational context, but had to exclude certain variables due to organizational constraints, such as the lack of variability in personal control over behaviours and management concerns about eliciting values. The study of Scherbaum et al. (2008) was thus able to only test the effects of worldviews and personal norms on behaviour and behavioural intention, thus providing a test for a few of the relationships in the model. As Stern's proposal was that antecedents of personal norms can also have a direct effect on behaviour, the authors of this study hypothesized that environmental worldviews will affect behaviour both directly and indirectly, through the mediation of personal norms. A previous study by Nordlung and

Garvill (2003) had found that personal norms affect individuals' intentions to reduce automobile use and based on this Scherbaum et al (2008) have included a measure of behavioural intention in their organizational study. They hypothesized that personal norms would be related to behavioural intention, that they would mediate the relationship between worldviews and behavioural intention and that worldviews would also have a direct effect on intentions, in line with Stern's assertions.

The study used focus groups and questionnaires to evaluate determinants of energy conservation behaviours at work. Their results confirmed that worldviews and personal norms are significant predictors of energy-conservation behaviours in the workplace, but showed that worldviews do not have a direct effect on behaviour. They also showed that these two variables account for 14.1 % of the variance of reported behaviour, and a much higher variance (42.9) of behavioural intention, which is in line with studies on energy conservation behaviours in households.

Another study by Lo *et al.* (2013) focused on factors determining travel-related behaviour in the workplace. The same qualitative methodology was used as in the previous study, in four organizations in the Netherlands, which provided rich results on the individual and organizational factors affecting mobility-related behaviour in the workplace. A few interesting results are worth noting: first, motivations of travel choices are not related to environmental concern, but workers emphasize perceived infrastructural constraints, organizational influences and non-environmental personal and work-related motives as influences on their behaviour, which could be grouped in reasons related to time and efficiency, personal comfort and job-related, organizational and financial constraints. Secondly, only superiors´

preferences are considered a relevant influence on travel choice mode, with no other source of social norm influence being acknowledged by the interviewed workers. Regarding self-efficacy, workers considered relevant the extent to which they could control or cope with external factors such as infrastructure, demands of clients or organizational facilities and policies as relevant in their travel mode choice. Individual factors that were found to explain variation among workers were personal preferences, family responsibilities, work habits and job requirements. An interesting finding is that workers differ in the importance they attach to certain attributes of travel mode, with public transport users considering not paying attention to traffic as a major advantage, car drivers considering privacy as very important, and train riders considering te opportunity to use the time to work as very important. The importance accorded to time and comfort also registered variations.

In terms of organizational factors, it seems that financial incentives supported a car use behaviour as all companies compensated for commuting costs, and they did not compensate car drivers for any other means of transportation, which led to car users not considering alternatives. Restrictions of free parking seem to be an effective policy in curtailing car use. A negative social norm towards energy-efficient cars seemed to be perceived by workers, as managers were perceived to value big cars and oppose environmental restriction policies on the range of company cars to choose from.

Possibilities for change were considered to be low by the authors, as employees considered their chosen mode of transportation as the optimal choice for them.

Individual differences among workers seem to correspond to some extent to the organizational culture and focus differences at the organizational level, such as those related

to tolerance of time loss and travel frequency (private companies considered time efficiency as more important than NGOs). There are also differences among different work related travel behaviours, with social norms and managerial control exerting a higher influence on business travel frequency and mode choice than on commuting travel mode choice (Lo et al., 2013).

Although these studies did not test a complete theory of pro-environmental behaviour, it is worth noting that they mixed elements of the VBN with elements of TPB (e.g. self-efficacy as an operationalization of perceived behavioural control), finding elements from both theories to be important in explaining workplace pro-environmental behaviour, albeit in a qualitative exploration. The evidence regarding some of these predictors is mixed, and at least one study which applied the VBN framework found it to be of moderate relevance in organizations (Andersson et al., 2005).

A more recent approach to pro-environmental motivations that tries to go beyond the dichotomy between rational choice theories such as the TPB and moral motivation theories such as NAM or VBN, is goal framing theory, which has proposed a framework that accounts for the co-existence of multiple motivations for human behaviour, and endeavors to explain in which contexts a certain category of motivations would be more likely to influence behaviour.

Goal framing theory postulates three different types of goals that drive pro-environmental behaviour in any given situation: hedonic, gain and normative goals. Hedonic goals are defined as a focus on improving individual feelings in a given situation, by avoiding effort, seeking direct pleasure or seeking excitement. Gain goals are defined as the motivational force that prompts people to be sensitive to changes in their personal resources such as money or status. Finally, normative goals entail a focus on the appropriateness of one's actions.

As human action is purposeful, goals steer attention in certain directions and influence the type of information people detect, what information is cognitively accessible, what action alternatives are perceived and considered, as well as how people will act in a given situation. The authors also contend that the goals that are the strongest in a given situation will most strongly influence cognitive processes and decision-making, while goals in the background will increase when they are compatible with the main goals, or decrease when they are in conflict with them. Goal strength may vary across situations, with changes not accessible to conscious awareness, and their strength will also be influenced by individual dispositions or contextual cues (Lindenberg, 2012; Steg, 2012).

The theory also postulates that although acting pro-environmentally is now considered the appropriate thing to do by most people, and as such would be motivated by normative considerations, it tends to be less profitable, less pleasurable and more time-consuming or effortful. However, this is related to the fact that pro-environmental behaviour is not the norm in our societies, with systemic and structural factors constituting important barriers to pro-environmental behaviour. Public transport, for example, is not considered as pleasurable as car use, in many cases due to its lack of efficiency or comfort. It is hard to say what would happen if public transportation systems that would be more effective and comfortable were available and urban experiments with such systems have provided partial evidence to this effect.

The variety of goals that workers might have in organizations have at any given moment led Unsworth *et al* (2013) to consider goal framing theory as a useful way of approaching pro-environmental behaviour in organizations. With the purpose of proposing a framework for

understanding psychological conditions that are likely to improve the effectiveness of interventions in organizational contexts, the authors start from the assumption that green goals are only one category among a long list of goals workers have and juggle every day. They propose an integrated stage-based model to explain interventions to change pro-environmental behaviour at work. They consider that each stage between the intervention and the outcome will have a series of moderators that will be influential.

The first stage is one of goal activation, and this depends on an interaction process between the intervention and the characteristics of the worker. Thus, self-concordance will influence goal activation at this stage (self-concordance is defined by these authors as the degree to which pro-environmental behaviour expresses an employee's stable interests and values, following Sheldon and Elliot, 1999). They also differentiate between initial self-concordance and ongoing self-concordance – which can be affected by the intervention itself. Self-concordance will influence the attractiveness of the behaviour (Klein *et al.,* 2008). Attractiveness depends on both employee characteristics as well as the features of the intervention: the stronger the pro-environmental goal activation, the greater the likelihood that the employee will engage in the behaviour in the short term.

The authors use goal systems theory to look at the hierarchy of goals, with higher order, abstract and longer term goals situated at the top of the hierarchy (values), identities and long term project goals in the middle, and concrete day to day task goals at the bottom of the hierarchy (Austin and Vancouver, 1996, cited by Unsworth *et al.*, 2013). They also contend that the pattern of connections between goals is more important than any particular goal, and they become stable over time and over repeated behavioural connections. There is also a

significant differentiation between focal goals and background goals at any given moment in time, due to attention limitations. From this perspective, it becomes important to identify what happens when particular goals or patterns of goals are being activated, or when there is goal conflict between green goals and other worker goals. In the second stage of their model, higher-order goals of the individual's pattern will become activated when related to the environmental goal and this will happen only when the goal is self-concordant. The activation of higher-order goals is very important as it strengthens the motivation to act (Kruglanski et al., 2002, cited in Unsworth *et al.,* 2013). It has also been previously proven that engaging in a behaviour that fulfills a personal important goal generates positive affect and further motivating potential (Louro, Pieters and Zeelenberg, 2007, cited in Unsworth *et al.,* 2013). Concordance also ensures longer term effects of interventions, through the activation of higher order goals.

In a second stage, broader goal activation occurs, depending on other tasks the individual has to perform at work. In the final stage there is movement from goal activation to outcome. There are two possible situations in this stage: there is no other goal or there are, in which case conflict arises. According to these authors, goal conflict is much more likely in the workplace than in other areas of life, as performance-related goals are highly relevant for employees, and they will commonly be activated. When confronted with conflicting goals, employees can either balance them, switching from one to another or keep working on the focal goal, and the strategy they use depends on the level of self-concordance. Employees for whom pro-environmental goals are not self-concordant will more likely use a balancing strategy which can also explain the rebound effect, according to these authors; employees in a

situation of high self-concordance will more likely use a focusing strategy. Goal conflict also takes resources away from the focal goal. However, these authors also note that it will rarely be the case that a green goal will be a focal goal in organizations, unless the employees are really highly environmentally-motivated. Other goals will have prominence and this provides an explanation of why pro-environmental interventions are not very successful in organizations. This would also lead to an on-and-off pattern of pro-environmental behaviour depending on whether other goals that are focal become prominent at different points in time. When other focal goals are considered highly unlikely to be achieved or almost completed, then pro-environmental behavioural goals are more likely to become focal, which would make the timing of the pro-environmental intervention relevant in organizations.

Other studies have tried to mix elements of the two types of theories mentioned above with contextual elements that are relevant for organizations, with the aim of advancing new theoretical frameworks that can be adequate for the organizational context. Building on the work of Boiral (2009) on applying the organizational citizenship behaviour framework to pro-environmental behaviours at work, Lulfs and Hahn (2013) start out to make a contribution to the study of determinants of pro-environmental behaviours, considered to be a particular type of organizational citizenship behaviours (OCBEs). The authors differentiate between voluntary pro-environmental (VPBE) behaviour at work and other forms of pro-environmental behaviour and set out to establish the determinants of VPBE by using established theories in pro-environmental psychology. They propose a conceptual model to explain VPBE by integrating organizational contextual factors, with individual factors from both TPB and NAM, but enhancing them through the introduction of an organizational-

specific understanding of perceived behavioural control (composed of perceived corporate environmental performance and perceived supervisory support), and introducing habit as a moderator between the intention to act pro-environmentally and the performance of the behaviour itself.

Further attempts have been made to combine organizational and individual factors to explain pro-environmental behaviour in the workplace. Tudor, Barr and Gilg (2008) have proposed a framework for examining environmental behaviour in organizations, in the domain of waste management in a large public organization. In a study of the National Health Service in an area of the UK, they looked at both organizational and individual antecedents of pro-environmental behaviour in a large organizational context. The key organizational factors included in their study are: organizational focus, organizational structure, organizational type and size, department type and size and organizational culture. Their results indicate that organizational focus has a high influence on pro-environmental behaviour in the workplace, especially when coupled with clear organizational targets and control over reaching them. The authors argue that these factors contribute to an organizational culture that supports pro-environmental workplace behaviour, which in turn has an impact on attitudes, beliefs and motivations of employees. However, organizational focus also generated apathy toward non-core goals, which can have a detrimental effect on proactive workplace behaviours for example. Financial limitations were also important in driving attention away from noncore activities, especially if they involved costs (Tudor *et al.,* 2008). Sustainability was not found to be a priority among managers and organizational culture is found to be a key obstacle to

change. As previously argued, organizational focus and supervisory support are elements of an organization´s culture and these steer away from sustainability goals in this case.

The authors also considered a series of individual factors that might influence pro-environmental behaviour in the workplace. Their results showed that attitudes and beliefs had a significant influence on waste management behaviours. Motivation, however, was not so straightforward. The study found high levels of apathy and a feeling that not much can be done as an individual to change the system, and this was held by both regular employees and managers. This was related to the high levels of centralized control in the organization (Tudor *et al.,* 2008). Although some of the workers stated that protecting the environment was important for them at a personal level, they did not feel that acting pro-environmentally at work was something that motivated them. In terms of socio-demographic factors, they found that older staff displayed more sustainable waste management behaviour than younger staff.

Although research that systematically combines organizational and individual factors influencing pro-environmental workplace behaviour is relatively scarce, Lo *et al.* (2012b) have performed a systematic review on the determinants of pro-environmental behaviours in organizations, and 21 studies were reviewed. This review is interesting for two reasons: first, it outlines the most important determinants of pro-environmental behaviour in the workplace, based on existing empirical evidence. And secondly, it examines the main gaps in the existing research. I summarize here the results of this review.

Several important gaps can be identified in previous research:

- In general, there is no coherent integration of organizational and individual determinants of behaviour (with the exception of two studies by Tudor *et al.,* 2007; 2008).

- Different organizational subgroups are normally not compared;

- There is insufficient evidence on the role of social norms on pro-environmental behaviour in organizations, including the role of a lack of pro-environmental social norms;

- There is insufficient investigation of the role of self-efficacy, while many interventions target behavioural competence.

- Little research is available on general organizational determinants such as organizational culture or organizational structure and their effects on specific behaviour; there is also a need to more precisely operationalize organizational culture and analyze the effects of its different elements on specific areas of pro-environmental behaviour. So far, only perceived support for environmental sustainability as part of the organizational culture has been studied (Andersson et al., 2005; Ramus and Steger, 2000).

- Effects of interventions are not easily interpretable

- Most studies rely on self-report measures

- More qualitative research is needed to uncover the relationships between organizational and individual factors in organizations.

Several of these gaps were taken into account when the studies presented here were designed. Thus, several organizational subgroups were taken into account, and social norms and self-efficacy were considered among the most relevant factors that could have an influence on pro-environmental behavior in the workplace. As will be seen later, social influence processes have proven to be among the most important determinants of pro-environmental behavior.

Also, systematic research was carried out on the role of organizational culture and structural factors were given a lot of attention, and qualitative methods were used alongside quantitative explorations of behavioral antecedents.

1.3. The relationship between behaviours at home and behaviours at work

Spillover has been defined as the process by which changes in one behaviour triggers changes in other behaviours in different contexts (Muster, 2011; Thøgersen and Olander, 2003; Whitmarsh and O'Neill, 2010). Governments and environmental organizations have tried to look for what have been called "catalyst" behaviours, considered to be those behaviours with the highest possibilities to provoke wholesale lifestyle changes (DEFRA, 2008; Crompton and Kasser, 2010).

Several types of spillover have been identified. First, spillover can occur either between different life domains, such as work and home; or between domains or types of behaviour, such as recycling and energy conservation. A further differentiation has been made between spillover of behaviours occupying the same level of difficulty and spillover from an easy behaviour to the adoption of progressively more difficult behaviours, with the latter exerting a particular appeal to policy-makers due to the relatively low political costs of enforcing policy that is "simple and painless" for citizens. Furthermore, research has differentiated between positive and negative spillover (Thogersen and Őlander, 2006), with positive spillover being considered the desired effect of taking up a new pro-environmental behaviour then influencing the adoption of subsequent environmentally-friendly behaviours in other life or

behavioural domains. Negative spillover has been defined as the undesired effect of the adoption of one pro-environmental behaviour leading to the non-adoption of another, due to psychological licensing effects, by which one justifies not doing more with beliefs and perceptions about having done one´s fair share.

Previous empirical research has found positive relationships between behaviours performed in different domains. Thus, a study by Thøgersen and Őlander (2006) found correlations between buying organic food and recycling, buying organic food and using alternative transport, recycling and using alternative transport, and reached the conclusion that these behaviours could have common motivational causes. Behaviours can be perceived as similar either in terms of their objective characteristics, such as in terms of the time and place in which they are performed or the specific sequence of actions they entail, or they can be similar in terms of their relationship to a goal, and previous research has shown that people use both types of categories to structure their knowledge (Hoyer and MacInnis, 2006; cited in Crompton and Thøgersen, 2009). There is some evidence available suggesting that behaviours that are similar in terms of their objective characteristics tend to be more strongly correlated than behaviours that are not (Stern *et al.*, 1999; Thøgersen and Ölander, 2001), thus suggesting the possibility that positive spillover is occurring, except for the cases where two behaviours are perceived as being substitutes for each other, such as recycling being perceived to be a substitute for waste prevention during shopping, so if people engage in one, they tend to engage less in the other (Thøgersen, 1999).

In their report on spillover and the influence of encouraging simple and painless actions on the likelihood of other forms of political engagement for climate change, such as passive

acceptance of far-reaching policies or active commitment to influence government definitions of policy, Crompton and Thøgersen (2009) question the use of campaigning for pro-environmental behaviour change on the basis of self-enhancing values and goals, such as financial gains and status, and they argue for the role of promoting pro-environmental behaviour for environmental reasons, basing their arguments on existing scientific evidence regarding spillover.

One interesting conclusion of the spillover research has been that positive spillover between behaviours of comparable ease is a real possibility, while the evidence for the "virtuous escalator" effect (taking up an easy behaviour that might influence the subsequent take-up of more difficult behaviours) indicates that it does not happen (Crompton and Kasser, 2009).

Several theoretical explanations have been proposed for the phenomenon of spillover, although it has been argued that spillover is hard to explain theoretically (Thogersen and Őlander, 2006). Using self-perception theory (Bem, 1972), which contends that people develop their concepts about the self by observing their own behaviour, a few studies (e.g. Holland *et al.*, 2002) have suggested that carrying out a pro-environmental behaviour leads people to change their attitudes in a pro-environmental direction, thus predisposing them to further carrying out other pro-environmental behaviours. Another suggested that the observation of own behaviour leads people to activate pro-environmental values (for those already holding them) thus leaving them predisposed to carrying out further behaviours along the same lines (Cornelissen *et al.*, 2008). This would be supported by a study using an experimental design which has shown that priming pro-environmental values enhances attention to, and the weight of information that is consistent with the activated values which in

turn increases the likelihood of pro-environmental consumer choices (Verplanken and Holland, 2002). The condition for the observation of own behaviours to act in the direction of self-perception theory is that the behaviour needs to be perceived as freely chosen and goal directed. It is in these conditions that the supporting attitudes become more accessible from memory and therefore more predictive of behaviour (Glasman and Albarracín, 2006; Knussen *et al.*, 2004). Besides experimental research, survey research has also suggested that spillover is related to common antecedents such as pro-environmental goals and values (Thøgersen and Ölander, 2006).

It has long been noted that there is a significant gap between the values and attitudes that people hold and their behaviour. The absence of larger spillover effects suggests that people sometimes also hold inconsistencies among the various behaviours they perform, given that they consider the behaviours to belong to the same category (such as contributing to the environment – a goal directed category). The theory of cognitive dissonance (Festinger, 1957) suggests that when people experience such inconsistencies, they can engage in either behavioural or psychological strategies to reduce the uncomfortable feeling arising from the experience. Behavioural strategies targeting behaviour change are more costly, however, which implies that people will engage in behavioural strategies only when psychological strategies are not possible. Reducing cognitive dissonance has been put forth as a possible explanation for positive spillover, with two caveats: the first is that the inconsistency has to be perceived as important (i.e. to violate a key element of the person's self-concept, and question that person's competence, morality or reliability – Dickerson *et al.,* 1992); and the second, that behaviours among which there is inconsistency should be relatively similar, as different

behaviours make justification (a psychological strategy) easy (Thøgersen, 2004). However, cognitive dissonance theory can only be applied to explain spillover when pro-environmental values and goals are central to a person's self-concept, and provides no useful explanation for the spillover understood as taking up a new pro-environmental behaviour which would open the door to more pro-environmental behaviours. Considerable value changes should take place as a consequence, and yet values are said to be stable across a person's life. Thus, a certain level of endorsement of either biospheric or altruistic values is a precondition for interventions targeting their activation in behavioural contexts.

Even those holding strong pro-environmental values and goals, who are likely to experience intense cognitive dissonance when performing harmful behaviours that might be costly to change (such as taking flights), might engage in less difficult behaviours to relieve discomfort, as research has suggested (Bratt, 1999). This is even more likely due to the ways in which pro-environmental campaigning and policy has been using messages that have insisted upon a "contribution ethic" (Holland et al., 2002) and thus has made accessible this type of strategy for cognitive dissonance reduction (Crompton and Kasser, 2009).

Another explanation proposed for positive spillover suggests that acting in pro-environmental ways leads individuals to acquire new knowledge about environmental issues and what to do to address them, as well as new skills, thus making adoption of other behaviours easier (Thøgersen, 1999; De Young, 2000). A recent study found that at the same level of pro-environmental motivation, the most important predictor of the purchasing of an eco-label was the past purchases of other eco-labels. The explanation proposed for this has been that people acquire knowledge about eco-labels and they build new routines, with behavioural choices

becoming less difficult and consuming less cognitive energy (Thøgersen *et al.*, 2008). However, it has been suggested that this would decrease when behaviours become more difficult (Crompton and Thøgersen, 2009), and this argument is supported by the evidence of people overestimating the importance of their own pro-environmental behaviours (a self-serving bias) (Pieters *et al.*, 1998).

The contribution ethic, together with the self-serving bias mechanism, lead to negative spillover (i.e. taking up a certain pro-environmental behaviour leading to not taking on others), as one study has suggested (Thøgersen, 1999). The co-occurrence of positive and negative spillover has also been proposed as one of the reasons why sustainable consumption behaviours do not become generalized (Thøgersen and Ölander, 2003). Thus, the report by Crompton and Thogersen (2009) concludes that the insistence on the adoption of simple and small behaviours mostly in the private sphere together with the strategies to emphasize self-interest and status when promoting certain pro-environmental behaviours leads to the widespread perception that one is doing one's bit through such small behaviour and that they are enough to achieve significant environmental impact on a global scale. There is evidence showing that payment for compliance with a certain request (using the foot-in-the-door technique) would lead to individuals being less disposed to comply with a subsequent request, when no payment is offered ((Burger and Caldwell, 2003), thus corroborating evidence from behavioural economics that individuals' intrinsic motivation for behaviour is 'crowded out' by promoting extrinsic motivation. Also, behaviours that become social norms are less likely to be used as a diagnosis of personal pro-environmental values and attitudes and thus have less impact on self-perception.

Spillover has also been related to other individual cross-situational determinants such as identity (Whitmarsh and O'Neill, 2010). Self-identity is considered to be influenced by both personal motivations (for self-esteem, self-understanding and self-enhancement) but also by social interaction, especially the demands and expectations of others and the roles we perform (Ellmers, Spears and Doosje, 2002, cited in Withmarsh and O'Neill, 2010). It serves both the purposes of differentiating oneself from others and comforming to the values, beliefs and behaviours of the social groups to which one belongs (Christensen *et al.,* 2004). Previous research has shown, for example, that consumption behaviours and especially the adoption of new products are related to an individual's identity (Cook et al., 2002; Grewal, Mehta and Kardes, 2000). Specific and general self-identities play different roles for pro-environmental behaviour. A review of spillover literature has suggested that specific identities might account for consistency of a specific behaviour over time while a general green identity might explain spillover between behaviours (Crompton and Thøgersen, 2009).

The study by Whitmarsh and O'Neill (2010) found that, for carbon-offsetting behaviours, both the specific self-identity (i.e.: as a carbon-off setter) and past behaviour exert a strong positive influence on behaviours, while general pro-environmental identity was found to be a significant but weak predictor. Across all behaviours, pro-environmental self-identity was the stronger predictor. Their research also suggests that identity is a stronger cross-situational motivation than values and that background variables such as age, household composition, urban vs rural location and education are important determinants of all behaviours and especially travel behaviours.

While these studies start to show a few important things about the transference of behaviours, the research is still scarce and mostly carried out on behaviours undertaken in the private sphere. Also, spillover is considered among categories of behaviour, but not among life contexts. Sociological literature has suggested that different life contexts are dominated by different 'logics', which entail different rules, norms, relationships and practices (Clark, 2000). These logics include different individual roles as well as whole sets of rules about levels of autonomy and agency, and cultures of either promoting change or favouring stability. To further complicate matters, individuals differ in their perceptions of different life contexts as constricting or supporting and in their personal propensities towards either complying or promoting change. Different social groups have differing perceptions about these aspects, as social support is known to be one of the most important factors influencing consistency between attitudes and behaviour (e.g. as minority influence theory would also suggest). It is reasonable to expect that these complex patterns of expectations would lead to the activation of personal predispositions that might work against positive spillover. However, to our knowledge, there has been no systematic research undertaken on the transference of behaviours from one life domain to another, with the exception of a brief consideration of this phenomenon by Tudor *et al.* (2008). The relationship between the different domains of home and work, as the two most relevant lifestyle domains, has not been previously investigated.

Given this scarcity of research on spillover between work and home, two questions arise: first, whether there is any evidence that spillover might take place between the domains of home

and work; secondly, if it occurs, under what conditions either positive or negative spillover takes place and what factors can be identified that might be driving such a tendency?

Organizations and the workplace can play a significant role in promoting pro-environmental behaviour, and the necessary conditions for the facilitation of spillover effects, both between categories of behaviour within the workplace, and between the domains of work and home.

Three studies have undertaken the issue of behavioural spillover between life domains, although they have done so rather marginally. In their qualitative study that included focus groups and interviews with key informants, Lo *et al.*, (2012a) found that spillover from home to work and vice versa was taking place for some employees, but not for others, with the latter arguing that the organizational context hindered the transference from one life domain to the other. It seems that the role of the organizational context in hindering pro-environmental behaviour is corroborated by evidence on the effectiveness of interventions in households as compared to workplaces, showing that in workplaces it seems it is difficult to break out of old roles and play new ones (Nye and Hargreaves, 2010). It has been argued that workplaces require hard data and facts to justify new actions, which could be a significant barrier for workers intent on bringing pro-environmental behaviours from home into the workplace (Blok *et al.*, 2013).

In a study of Tudor *et al.* (2008) on waste management behaviour in a public health organization, the results show that environmental practices at home for waste management behaviours correlated strongly with waste management behaviours at work, showing that behaviours in the same domain might get transferred from one life context to another. As their study emphasizes a lot of organizational barriers in the workplace, this might suggest that

practices are transferred due to individual common antecedents such as attitudes, beliefs or identity, although they did not explore this last one.

A third study has proposed that spillover occurs because of equifinality and the perceived proximity of completing a green goal. Equifinality refers to the number of behaviours being linked to a green goal. It has an effect on the persistence of work towards achieving the goal. Unsworth et al. (2013) have suggested that employees with a high level of equifinality for their green goal but with moderate goal attainment proximity will be more likely to spillover the behaviour to other contexts. With the activation of higher order goals, especially as a consequence of workplace interventions, workers will continue working towards the achievement of the goal and thus spillover is more likely to occur than in the case of workers that do not have a high level of equifinality or consider that the goal will be fulfilled through performing the behaviour targeted by the intervention in the workplace only.

It is immediately visible that research on spillover between different life domains is rather scarce. Considering the amount of time people spend at work and the significance of this life domain in people's conceptions of self and their sense of meaning, understanding how behaviour gets transferred between life domains seems worthwhile. Given that transference is a two-way process, the effectiveness of societal interventions for shifts in lifestyles and practices towards more sustainable ones can be strengthened if the conditions for transference are identified and put into place. It is also worthwhile to enquire about the existence of both positive and negative spillover. Given the evidence on negative spillover coexisting with positive spillover (Thogersen, 2004) and the mechanisms underlying negative spillover such as the contribution ethic, it is possible that organizational sustainable behaviour might lead to

a feeling that one is already doing enough, which in turn might diminish pro-environmental behaviour at home. Furthermore, negative spillover might occur independently of whether individuals feel that their pro-environmental behaviour at work is freely chosen or it is imposed on them by the organizational rules, norms, or role descriptions. If they are freely chosen, the "doing one's bit" justification might lead to a situation in which individuals find it easier to not undertake environmental behaviours at home or to give up the ones they are already doing. And if they are imposed or extrinsically motivated, such as through systems of sanctions and rewards, this might lead to a situation, according to self-perception theory, in which individuals cannot infer pro-environmental attitudes, or goals from the carrying out of a pro-environmental behaviour and thus be less likely to carry it out to the home. This is also the case in organizations with strict regulations for waste management for example.

Methodologically, it is also challenging to investigate spillover through traditional quantitative methods of survey research, which only allows for correlational evidence of spillover. Longitudinal studies, with either primary or secondary data, are needed to identify whether interventions have the effects they look for in promoting spillover, especially between home and work. An example of such a study is the one carried out by Thøgersen and Ollander (2003), using secondary data, in which they used data from several years to look at spillover effects longitudinally (e.g. heavy recyclers in 1998 tended to increase their purchase of organic food products more than average between 1998 and 1999 and to decrease their use of public transport and/or bicycle less than average between 1998 and 2000, thus showing the coexistence of both positive and negative spillover between categories of behaviour; their results also indicate caution in interpreting negative spillover results, as those people that

perform well in one domain might have less room to perform more in another due to the ceiling effect). Creative experimental studies are also required, that might investigate whether carrying out pro-environmental behaviours in the workplace, through interventions that might target any of the antecedents (e.g. activating values), has both short and medium-term effects on the behaviours carried out in the home. Finally, as Lo *et al.* (2012a) have mentioned with regards to the need for disentangling the relationship between organizational and individual antecedents of pro-environmental behaviour in the workplace, more thorough qualitative research needs to be carried out for the domain of spillover between home and work, in order to further understand the degree to which it happens and the main barriers and drivers that might also orient interventions.

One study carried out within the LOCAW project on the transference of practices between work and home in two large transnational corporations, Volvo and Shell, illustrates the potential of qualitative in-depth exploration of the phenomenon of spillover. This study started from adopting a different view on the conceptualization of this phenomenon, by considering individuals as border-crossers between life domains governed by different logics, following the work of Clark (2000), thus taking into account their role as active agents in organizations, who are not only passively being influenced by organizational contexts, but play an active role in shaping them as well (Uzzell et al., 2012).

The authors conceptualize border strength as being defined by several characteristics: permeability, flexibility and blending. Understanding the degrees of permeability, flexibility and blending that borders between work and home allow can provide very interesting insights into the barriers to and drivers of pro-environmental behaviour transference. Permeability

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refers to the degree to which elements from one domain can penetrate into another, flexibility is defined as being marked by the social relations that workers establish in the workplace, with friendship relationships supporting the translation of elements of the logic of home domain into the workplace, and blending is marked by the existence of spaces in which elements of the logics governing the domains of home and work are mixed, thus lowering the strength of the border between the two.

By using in-depth life history interviews with workers at different levels of decision-making, the study reaches relevant results on the interaction between organizational and individual factors in facilitating or hindering pro-environmental practices in the workplace and in promoting the transference of good practices between the two domains.

Firstly, one relevant conclusion refers to the impact the nature of the work carried out by the two organizations has on workers´practices. As the studied organizations were two heavy industry transnational corporations whose object of work contributes to environmental problems (Shell, as an oil-extracting company; and Volvo as a truck producing one), workers, and especially, pro-environmentally-minded ones, experienced a lot of contradictions between their personal values and practices outside of work and their work life. This was more so for Volvo workers, who tended to be quite environmentally-minded outside of the workplace. The study identifies a series of strategies that workers use to deal with these contradictions, with maybe the most important one being the developing and maintaining of strong borders between the domains of work and home, through the difference between their public and private self. This is a highly relevant result, as it shows that the strength of the border is influenced by workers´ subjective experience of contradictions and multiple life goals and

realities, besides the characteristics of the organization itself. Other strategies the researchers find are: selective identification (identifying with some elements of one's work and de-identifying with others), shifting responsibilities to others and aiming at consistency by applying the same principles (e.g., efficiency, responsibility) in different life domains. However, as the authors themselves note, just as contradictions can lead to strategies that hinder pro-active behaviour in organizations, it can also constitute an opportunity for reflection and change, as workers who experience them might be more willing to change their practices if provided with a supporting context.

Secondly, the authors mention autonomy as a key aspect of workplace behavioural change. Organizational contexts that promote autonomy not only on marginal issues but on central aspects of the work process promote more engagement, satisfaction, an care for environmental issues (as exemplified by the case of Volvo, in which changes in work organization had led the company from promoting team work to an assembly line model). Border crossing is more likely to happen when there is homology of practices and when the conditions of the two life domains in terms of autonomy in decision-making processes are similar.

Thirdly, spaces where elements of the two logics combine are particularly important in the initiation of organizational change. The study identifies spaces in which this happens, such as workplace lunchroom, and times at which regular working places such as offices experience blending, through the activities workers perform, such as when eating lunch is done at the desk. The organization plays an important role in shaping these ´third places´that are neither work nor home, in order to make conditions similar and facilitate the transference of

practices. Infrastructure plays a key role in this. If workers recycle food packaging at home but do not have the necessary bins to do so in the office, practices will not be transferred between the two domains and differences between the two will encourage seeing them as radically different, further widening the gap between them. Other organizational factors such as organizational culture, marking the level of hierarchization within it and the openness of managers to suggestions coming from workers were also found to play a relevant role.

The study concludes that individuals cannot be expected to transfer practices from one domain to another, and elements of power, control over decision-making and the real possibilities for influence need to be taken into consideration. However, possibilities for change have also been identified, although they are underutilized by organizations. Workers have valuable knowledge on the production processes and overall functioning of organizations which can be harnessed to contribute to processes of organizational change (Räthzel and Uzzell, 2011). Also, the existence of contradictions and the understanding of factors that contribute to the need for strong delineations between home and work, can support organizations in seeing the advantages of putting conditions in place that might give workers a voice and, as a consequence, weaken the borders between work and home.

1.4. The role of universities in the mitigation of climate change effects

In recent years, there is a growing recognition of the role of universities in the transition towards a more sustainable society (Ki-Hoon et al., 2013; Lans et al., 2014; Sedlacek, 2013). Universities are workplaces, but they are also organizations that can play a key role in

educating young people on pro-environmental behaviour (Blok *et al.*, 2013), both explicitly (through the academic curricula; Lambrechts *et al.*, 2013; Pappas *et al.*, 2013) but also implicitly, through the modeling of normative environmental behaviour (Lukman *et al.,* 2013) and the facilitation of pro-environmental habits. Their role in the latter is particularly important as university years are among the most formative years for young people, not only in terms of knowledge content, but also in terms of habit formation.

Furthermore, besides their research and education functions, universities take part in governance at the regional and national levels, and they can have facilitating and mediating roles for promoting societal sustainability (Sedlacek, 2013). In regions that have a stakeholder oriented strategy, universities are seen as actors that are important for their sustainable development goals. However, it has been noted that in many cases both regions and universities do not fully use the potential of collaboration on sustainability issues (Zilahy and Huisingh, 2009, cited in Sedlacek, 2013). Universities tend to be embedded in regional networks, thus having the potential for cooperation with other regional stakeholders (Sedlacek, 2013).

Universities also create human capital by educating the workforce and endowing them with specific skills (Sedlacek, 2013). They can also promote larger societal learning. Recent research has shown, however, that the integration of education for sustainable development is still at its beginnings in educational institutions (Lozano et al., 2013).

Their research functions include both knowledge production and knowledge transfer (Sedlacek, 2013). Their effects can be measured in the productivity and innovativeness of regional firms. More recently, they have become relevant governance actors and the emphasis

is placed on their public responsibility. Universities have moved toward being stakeholder organizations (Bleiklie and Kogan, 2007) with many creating boards that incorporate both university and non-university members (Sedlacek, 2013).

Attempts to study individual factors affecting pro-environmental behaviours in universities have been scarce. A study conducted by Scherbaum et al. (2008) has explored energy-conservation behaviour at work, by testing a modified version of the Value-belief-Norm theory in a university, and focusing on clerical and maintenance staff only. Apart from the VBN variables, they introduced a measure of behavioural intention in their model.

Another recent study has focused on the pro-environmental behaviour of university employees and studied employees of a green university in the Netherlands (Blok et al., 2014). This study used both the Theory of Planned Behaviour and the Value-Belief-Norm theory to explore predictors of pro-environmental behaviour in the university as a workplace. Unlike the work of Scherbaum *et al.* (2008), this study included both administrative and academic staff. Their findings provide support for the use of the TPB in explaining pro-environmental behaviour in the workplace, but expand it by including factors such as social norms and leadership support, which they find to be important in explaining workplace behaviour. Besides leadership support, the exemplary behaviour of leaders had a significant effect on the intention of employees to act pro-environmentally, and other authors have argued that new behaviour is more likely to be adopted if employees see it modelled by managers (Wirtemberg et al., 2008).

However, this study also shows that personal norms, environmental awareness and self-transcendent values do not have a significant positive relationship with pro-environmental

behaviour in the workplace. Only certain pro-environmental behaviours are related to pro-environmental values, and according to these authors this is due to the fact that employees cannot act according to their values in the workplace in all environmentally-relevant areas of behaviour, but they are rather more dependent on the rules and routines of the organization, which are more difficult to change (Nye and Hargreaves, 2010; cited by Blok *et al.*, 2014). Furthermore, it was found that environmental awareness and personal norms have a direct impact on the intention to act pro-environmentally, thus having only an indirect effect on actual behaviour in the workplace, as opposed to the household. Values were not found to have a significant impact on the intention to act pro-environmentally in the workplace, but only on personal norms, thus again exerting only an indirect effect on the intention to act pro-environmentally in the workplace.

Vicente-Molina *et al.* (2013) have undertaken a comparative study on the influence of environmental knowledge on pro-environmental behaviour of students from four different countries (USA, Mexico, Spain and Brazil). They find that students from different countries differ in their levels of altruistic motivation, attitudes towards the environment and importance attributed to price in consumer activities. Knowledge on environmental topics seems to be low in all countries, with Brazilians scoring highest in objective knowledge. Levels of objective and subjective knowledge differ, with subjective knowledge always being higher than objective knowledge. The types of most common pro-environmental behaviour also differ according to country. Comparatively, Spanish students recycle the most, Mexicans are the most likely to use public transport, and US students are the ones buying more green products. They also showed that a relative increase in objective knowledge increases the

probability of high environmental performance. Formal education and knowledge of environmental issues affects pro-environmental behaviour but it does so in complex ways. Motivation and importance attributed to price of consumer activities best explain the probability of high environmental performance in all countries. In terms of motivation, pro-environmental behaviour is basically linked to altruistic motivations. Gender also appears to have a clear influence on pro-environmental behaviour.

A lot has been written on the role of education in promoting pro-environmental behaviour and more radical sustainable lifestyle change. Environmental education has been introduced as part of educational systems in almost all European countries and in some cases efforts have been made to treat it as a transversal topic and thus introduce a pro-sustainability optic in all subject matters. Although formal educational contents have an important role to play in acquiring the necessary knowledge and attitudes to carry out pro-environmental behaviour (Zilahy and Huisingh, 2009; Zsoka et al., 2013; García-Valiñas et al., 2010), universities can be influential in training people to perform important social roles effectively (Frank and Meyer, 2007) and thus act as change agents, modeling desirable lifestyles, instilling pro-social motivations, and a sense of responsibility and competence for the environmental impact of individual behaviour.

As young generations will be affected by environmental problems in ways that have not been experienced by the more mature generations today, it has been argued that the level of environmental education they have and the sense of necessity for contributing to societal change towards sustainability will be essential in their ability to manage environmental problems and consequences (Adomssent, 2013, Szerényi et al., 2009).

Considering the importance the university plays in shaping the "hearts and minds" of young people, it is rather strange that almost no studies have looked at the environmental knowledge of university students and its possible links to different types of pro-environmental behaviour (Zsoka et al., 2012). However, a few notable exceptions exist.

A study by Zsoka et al. (2013) has looked at the influence of sustainability education on students´ attitudes, their views on consumer lifestyles and their actual behaviour and willingness to engage in further pro-environmental behaviour. They compared the views of high-school students with those of university students which allows for a perspective on the comparative effects of university education on attitudes and behaviour. Their results show that almost all university students are capable of naming a significant number of climate change-related problems, and are more driven in acquiring knowledge about the environment than high-school students. They are also more aware of the importance of changing consumption patterns in order to mitigate climate change although about half the sample was also very optimistic about technology providing solutions to environmental problems. In terms of consumption habits, while university students bought more according to needs and were less likely to go shopping, they also expressed that they would like to shop more, if they had time and money. As a barrier for shopping, both university and highschool students referred to a lack of money as a main barrier, with environmental considerations occupying a much lower place.

The study also asked whether students would use alternative means of transportation if conditions and infrastructure improved. University students would prefer the bicycle in bigger proportions than high-scool students and about 60 % of university students currently not using

public transport affirm that they would switch to it if conditions improved. Those already using public transport or using combined public and private car transport to get to the university are much more willing to switch to bicycles than those travelling by car. The vast majority of university students (93.5 %) think that they are more environmentally conscious than their peers, which shows how perception of own behaviour is skewed due to a self-serving bias.

Regarding the behaviours of university students, they found that the three most common forms of behaviours that are regularly performed by university students are compressing plastic bottles before discarding them, collecting hazardous waste separately and choosing environmentally friendly modes of transport. The most infrequent ones are: considering the manufacturer's reputation when buying something, buying products with an environmental label and trying to use fewer chemicals when cleaning the house. These infrequent activities are much less common, however, in high-school students.

The two main barriers most commonly listed by university students are a lack of money and a lack of necessary structural conditions for living in an environmentally friendly way. The authors mention that improving structural conditions and increasing knowledge would have a positive effect but it is not so clear from the results that this would be the case, and people are not necessarily aware of or willing to admit what prevents them from acting pro-environmentally. Furthermore, considering the above mentioned result that indicated that students would buy more if they had more money, and mention again having more money as a driver of living more pro-environmentally, it is possible to see that students might have an understanding of pro-environmental behaviour as buying green products and not a clear

awareness of what sustainable lifestyle change might entail. Also, as the authors themselves allude to, there is no evidence of contestation of the underlying assumptions regarding economic growth or the desirability of consumerism.

The multidimensional scaling analysis they performed shows that a high level of environmental education is related to high levels of knowledge of environmental problems and the opinion that education is good for shaping behaviour. A pro-environmental lifestyle is associated to a willingness to use environmentally friendly modes of transport and to a lower perception of barriers for acting in pro-environmental ways. A high level of information is also associated to a lower belief in technological fixes and a willingness to pay more for pro-environmental products. More sustainable consumer behaviour is related to the belief that reducing consumption is necessary for sustainability and to the belief in the effectiveness of education in positively changing behaviour.

Based on similarities and differences on the dimensions studied, the authors performed cluster analysis which gave as a result five clusters that differed in their attitudes, education, knowledge and pro-environmental and consumer behaviour. These were: the active (22 %), the familiar (29 % - familiar with environmental issues but younger, less everyday pro-environmental behaviour and less committed to sustainable modes of transport), the techno-optimists (21.5 %), the hedonists (14.3 %) and the careless (13.2 %).

One important conclusion is that the behaviour of students was far more purposeful and their interests and information-seeking behaviours were shaped more by internal than external factors. This is also confirmed by studies that have shown that attitude-based teaching and learning has a higher influence on students´ pro-environmental behaviour than content-based

teaching (Alvarez et al., 2012). Also, taking into account the variety of levels of interest and awareness in students is important, as education tends to reach already committed students and not the others, who would be more in need of it (Zsoka et al., 2013). The authors also conclude that sustainable living and sustainable consumption should constitute more the focus of environmental education.

A few other results of previous studies regarding the pro-environmental behaviour of students are worth mentioning. In a similar comparative study of high-school and university students, Kagawa (2007) has shown that a favourable attitude towards the environment was far more important a predictor of pro-environmental behaviour than knowledge about environmental problems and their solutions (Kagawa, 2007), although for high-school students these drivers were equal in importance. However, and similar to adult populations in empirical studies, students are more likely to undertake low-effort behaviours than costly ones, such as reducing car use, are not willing to make radical changes and do not question the need to maintain economic growth as a goal. The relationship between environmental knowledge and behaviour is not a direct one, but it is rather influenced by interest in environmental topics and commitment to them.

Besides the knowledge they acquire during their schooling years, and the shaping of values and perceptions of personal responsibility that be a result of formal education, students are likely to be influenced by the models they encounter during their university years in their educators, and by the organizational culture of the University, which includes the social norms governing behaviour at the University. The expectations of behaviour they encounter in the university context can shape what they do both in this environment and outside it. If the

University provides a context that promotes pro-environmental behaviour and encourages the adoption of new sustainable habits, while also providing the autonomy and flexible learning and experimenting environment that leads to a perception of behaviour being freely chosen, it is likely that students will see their behaviour being influenced by such an environment. As mentioned above, carrying out pro-environmental behaviour, especially under the perception of the behaviour being freely chosen, can lead to the assumption of a pro-environmental self-identity, which in turn will influence what people do in other life contexts. Some authors have argued that the behaviour of students is most strongly shaped by the immediate environment (Lukman *et al.*, 2013), and that competencies can only be developed in a learning setting that is shaped to provide students with autonomy and opportunities for collaboration (Zsoka et al., 2013). We further argue that the University can play a more significant role in combining formal environmental training with in-context development of new habits of behaviour and even encourage students to go beyond compliance with pro-environmental social norms to pro-actively engage in both individual and collective efforts to promote radical organizational and societal change.

1.4.1 Previous research: the LOCAW project

The research presented here builds on some of the findings of a medium-scale European project called "Low-Carbon at Work: Modelling Agents and Organizations to achieve transitions to a low-carbon Europe" (LOCAW), funded under the 7th Framework Programme of the European Union, and involved the study of 6 large scale case study organizations, ranging from public to private, and from heavy industry to light industry and public services.

The overall aim of the project was to identify the main barriers and drivers to sustainable practices in organizations and to propose policy recommendations that would shape organizational transitions to sustainability. The studied case study organizations were: the University of A Coruña (Spain), the municipality of Groningen (The Netherlands), two transnational heavy industry companies (Volvo, Sweden; and Shell, the UK), one public water provider in Romania (AQUATIM) and the green energy-producing branch of the Italian company Enel (Enel Green Power). Using a multi-method empirical design, the project explored the complex factors supporting or hindering sustainable practices in the workplace, in three environmentally-relevant domains: consumption of materials and energy; waste generation and management, and work-related mobility.

Besides the empirical study of factors influencing pro-environmental behaviour in organizations and the transference of practices between life domains and categories of behaviour, the project went further and produced a series of policy pathways that were then formalized and tested through a technique of social simulation called agent-based modeling.

Diagnostic research carried out in the LOCAWproject provided me with data on the existing practices at the University and the level of importance attributed to them by the institution itself and by the collective of workers. Furthermore, document analysis data and research carried out in the other case studies provided a framework of comparison that was useful when interpreting results. Building on the general approach of the LOCAW project, a series of research questions were formulated for this thesis, which are detailed above.

1.4.2 Focus of the present research

The literature review presented above points to the fact that although pro-environmental behaviour research has flourished in the last decades, the tradition of empirically investigating environmentally-relevant behaviour in organizations is still rather feeble. A limited number of studies are available, and many of them focus on external factors conditioning the level at which organizations commit to sustainability goals.Furthermore, empirical research approaching organizational and individual factor affecting pro-environmental behavior tends to use one method only, or analyze one category of employees. Almost no studies test comprehensive models of behavior, and very few relate organizational and individual factors (exceptions are: Tudor et al., 2008; Lo et al., 2012a). Organizational research on the green performance of firms has also increased in the last years, together with the interest of the organizations themselves in adopting greener practices as part of their corporate social responsibility programs. These programs have first included sustainability as a token, and as part of a series of other measures designed to show accountability to the wider community, as pressures from citizens and policy-makers have also become more prominent. At European level, policy targets that involved cleaning production processes and life cycle analyses of products have become more ambitious, without, however, going beyond the questioning of economic growth based on the production and consumption of goods until recent years, in which this goal has started to be questioned, albeit still marginally.

As it was to be expected, organizations first assumed demands for sustainability by performing ´green-washing´, starting to mention sustainability in their corporate social sustainability strategies and sometimes adopting measures to reduce greenhouse gas emissions through technological changes. Environmental performance remained conditioned

to the goals of economic success and these two types of objectives were never considered of equal importance. It is only recently that some firms have started to articulate a core philosophy that considers economic, social and environmental goals as equally important. This ´triple P´ philosophy, as it is known, considers that organizations should include among their objectives care for the people and the planet, while still maintaining profit as a key goal. This perspective has been criticized by both sustainability researchers and other societal actors as maintaining the same premises that have led to the current environmental crisis, in which the modernist conceptions of progress and technological development, combined with the rise of the consumer society and global consumerist lifestyles have led to an extractive economy that has used up primary resources and has equated a good life and wellbeing with consumerism. A rise in recent trends towards a sharing economy, circular economies and lifestyles based on sufficiency rather than over-consumerism have also been translated to organizations, in the form of conceptualizations of managerial paradigms based on the economy of the common good, to give one example (Felber, 2012). How to decouple economic growth from resource consumption has also become a priority of European research, and a minority of organizations have gone beyond complying with regulations to reduce their emissions, and consider that those that go beyond these to adopt a functional strategy that takes into account ´planetary boundaries´ (Rockstrom et al., 2009) and become frontrunners in the green economy might also have a significant competitive advantage and be more resilient to changes in the natural, social and regulatory environment around them.

Furthermore, evidence is growing that the growing fluidity of the labour market and a European economy that requires highly educated and skilled workers have changed the

dynamics of the relationship between employers and employees. Research on worker productivity has shown that companies perceived as upholding sustainable values make for more satisfied and more productive workers (Delmas and Petkovic, 2013).

Although not qualifying as research evidence, public debates on the work demands of the "millennial generation" (those born between 1980 and 2000 now joining the workforce), are reflecting the changing profile of the workforce. In a popular online debate on this topic, an article on the myths and truths about this generation was stating the following: addressing the myth of "millennials are job hoppers who do not believe in company loyalty", the author responded:

> *"We want to feel part of something bigger than our jobs. We are much more likely to stay with a company that is transparent and engaging. We want employers who are ethical and fair, not gluttonous and harsh. We are loyal to those who care about us; this is something that has been slowly changing the culture of management and continues to make developments."* (Melissa Stuckless, post on a discussion group on LinkedIn on young professionals).

Although this type of presentation of the profile of the young workforce should not be taken at face value, but rather be submitted to scientific scrutiny, it does indicate a change in the public discourse regarding expectations that are starting to become the norm. Furthermore, it is far from clear that this type of expectations will actually be articulated in successful efforts to change workplaces, and if so through what mechanisms, as there is also evidence that collective organization (such as through trade unions) has decreased in European countries,

with the exception of Scandinavian countries (in Sweden, for example, around 71 % of workers belong to trade unions, according to the European Trade Union Institute)[1].

Organizational research on the green behaviour of firms has been carried out at aggregate levels (Etzion, 2007). Workplace pro-environmental behaviour has hardly been the focus of analysis, and it has been argued that many studies have focused on the behaviour of top management and generally considered irrelevant the behaviour of workers that do not occupy leadership positions. Only recently, the behaviour of workers has become the focus of analysis. Research undertaken on workplace pro-environmental behaviour has conceptualized it as a voluntary type of behaviour that can be undertaken either as part of the regular tasks or as extra-role behaviour (Lulfs & Hahn, 2013), and studies coincide in considering this type of behaviour as standing outside the normal reward systems of organizations. As shown above, research has focused on both organizational and individual factors, but a systematic integration of the two is still lacking. Research evidence is still quite disparate, although some interesting conclusions have been reached by different studies, regarding the role of leadership support or exemplary behaviour on the behaviour of workers (Blok et al., 2014). In terms of individual factors, classical theories of pro-environmental behaviour have been applied to organizational contexts, with varying degrees of success, with recent research going towards the integration of rational choice and moral motivations of behaviour. A few studies have also focused on both organizational and individual factors, but recent reviews have found empirical research on the two to be scarce (Lo et al., 2012b). Thus, it has been argued that more qualitative research is required, to understand how the two influence each

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[1] Data retrieved from: http://www.worker-participation.eu/National-Industrial-Relations/Countries/Sweden/Trade-Unions.

other, and to propose models that could more adequately explain pro-environmental behaviour in the workplace (Lo et al., 2013). In order to design effective policy to promote this type of behaviour, a better understanding of the factors influencing it is required.

Mirroring the situation of the majority of organizations, who still tend to consider pro-environmental objectives as secondary only to those of economic profit, research on the pro-environmental behaviour of workers tends to see it as something that needs to be incentivized as promoted by the leadership, with less emphasis being placed on the changes that might be promoted from the bottom up. Besides voluntarily carrying out tasks in a pro-environmental way, or performing extra-role pro-environmental behaviour, workers can play a bigger role in individually and collectively promoting changes of both production processes and everyday practices in the workplace. As it has been repeatedly outlined in the literature review, research on pro-environmental behaviour emphasizes the usefulness of behaviours being carried out in autonomy-promoting contexts, which support both satisfaction and the development of pro-environmental identities, in turn holding the potential of practices being transferred from one life domain to another (Delmas and Petkovic, 2013; Uzzell et al., 2012). Worker autonomy could also play a very important role in them individually and collectively changing workplaces for the better, and bringing environmental values and practices to the forefront.

Universities are organizations that can play a key role in this process, both as workplaces and as learning communities that educate future workers and citizens. As public organizations (at least in many cases in Europe) and workplaces, they can be frontrunners in efforts to promote workplace sustainability. They tend to be, at least in Spain, organizations that are democratically governed. They are thus particularly well-suited in also becoming autonomy-

promoting contexts in which workers can play an important role in promoting sustainability oriented changes. However, there is a significant lack of knowledge about what are the conditions under which even environmentally-minded workers could be motivated to, on the one hand, bring their good practices from the home domain into the workplace, and, on the other, to feel compelled to formulate suggestions and champion organizational change. As a consequence of the scarce knowledge available, clear interventions to promote pro-environmental behaviour in organizations are also lacking.

With the aim of advancing knowledge in this important domain, and filling in some of the gaps identified in the existing research, a number of *overall research questions* were formulated:

> How can the university become an organization that promotes pro-environmental behaviour and a culture of sustainability among its employees, students and larger surrounding community?
>
> What can it do to promote the adoption of pro-environmental behaviour and its transference to other areas of everyday life?
>
> How can it go beyond incentivizing low-effort pro-environmental behaviour, to promoting a context in which workers and students have the autonomy to champion organizational and societal change?

To inform our research objectives and methodologies, these questions were further divided into a series of *more detailed questions*:

1.   What is the effectiveness of the existing university policy and how much is pro-environmental behaviour supported?

2.   What are the barriers to and drivers of sustainable everyday behaviour at the university?

3.   What role do structural and organizational factors play in the facilitation or hindering of pro-environmental behaviour?

4.   What is the role of social influence processes on pro-environmental behaviour in the workplace? In particular, what is the effect of social norms on the environmentally-relevant behaviour of both staff and students?

5.   What is the role of individual psychological factors in determining pro-environmental behaviour at the university?

6.   What is the relationship between behaviour at work and behaviour at home for university staff and students? Is there any transference of behaviour between the two domains?

7.   How does the interaction of these two categories of factors factors play out in the university context?

8.   How can a process be set up that promotes both participation and commitment to environmental policy?

2. Research Methodology

2.1. Methodological strategies adopted

In order to answer the research questions formulated at the end of the previous chapter, a series of methodological strategies were employed (MS):

 M.S. 1: performing a baseline diagnosis of perceptions of barriers of and drivers to sustainable behavior at the university.

M.S. 2: performing an analysis of the structural and organizational factors influencing pro-environmental behaviour at the University for different actors, as well as possibilities for pro-active efforts to introduce environmentally-related organizational changes.

M.S. 3:: carry out an analysisof individual factors influencing pro-environmental behaviour at the University for staff and students, as well as behavioural transference between home and work.

- Perform an analysis of individual factors influencing pro-environmental behaviour at the University for both groups
- Identify existing behavioural spillover between work and home, and the barriers to and drivers of this phenomenon
- Investigate the effect of leadership role on pro-environmental behaviour

M.S. 4: propose and test two predictive models of pro-environmental behaviour at the University that would account for the role of individual moral considerations, on the one hand, and social influence processes on the other.

M.S. 5: Promote a participatory process that would involve workers in the formulation of workplace environmental policy and reveal preferences regarding future characteristics of the organizational environment.

Each methodological strategy used a series of research methods to answer the proposed research questions, following a multi-method approach. For MS1, focus groups with key informers were used. For MS2, in-depth interviews were used. For MS3 and MS4, a questionnaire was used to obtain the necessary data. For MS5, a back-casting scenario development method was employed. Results obtained through these different methodologies were integrated and disscussed in the context of existing literature, in order to provide a comprehensive picture of the necessary conditions and processes that would support transitions to sustainability in large public organizations, and contribute to advance knowledge on the individual, social and organizational processes that influence the promotion and adoption of sustainable behaviors in organizations.

Four studies were undertaken to answer the research questions posed for this study. The studies build on each other and each of them was formulated in such a way as to answer one or more of the research questions presented above. The following table (Table 2.1.1) provides an overview of the research questions, with their corresponding methodological strategies and methods employed and indicates which of the four studies addresses them.

Table 2.1.1. Overview of the research questions and methods

Research Question	Methodological Strategies	Research methods	Corresponding study
Q1. What is the effectiveness of the existing university policy and how much is pro-environmental behaviour supported?	MS1 MS2	Focus groups In-depth interviews	Study 1 Study 2

Q2. What are the barriers to and drivers of sustainable everyday behaviour at the university?	MS1 MS2	Focus groups In-depth interviews	Study 1 Study 2
Q3. What role do structural and organizational factors play in the facilitation or hindering of pro-environmental behaviour?	MS2	In-depth interviews	Study 2
Q4. What is the role of social influence processes on pro-environmental behaviour in the workplace? In particular, what is the effect of social norms on the environmentally-relevant behaviour of both staff and students?	MS3 MS4	Questionnaire	Study 3
Q5. What is the role of individual psychological factors in determining pro-environmental behaviour at the university?	MS3 MS4	Questionnaire	Study 3
Q6. What is the relationship between behaviour at work and behaviour at home for university staff and students? Is there any transference of behaviour between the two domains?	MS3	Questionnaire	Study 3
Q7. How does the interaction of these two categories of factors factors play out in the university context?	MS1 to 4	Focus groups In-depth interviews Questionnaire	Study1 Study 2 Study 3
Q8. How can a process be set up that promotes both participation and commitment to environmental policy?	MS5	Back-casting scenario development	Study 4

2.2 A Coruna: The policy context and the case study organization

Universities are key actors in sustainability transitions as workplaces and as learning communities. Their direct and indirect impact on society can be considerable in terms of training citizens who are knowledgeable of environmental problems and who also know how to act in sustainable ways both in their homes and at their workplaces – and are motivated to do so. The University members, both staff and students, with their patterns of energy and materials consumption, waste generation and organization-related mobility, have a considerable impact on the environment in terms of GHG emissions. Furthermore, the University plays a key role in the education of citizens in general, and thus has the potential to be an important contributor to a low-carbon Europe.

Climate change is a global phenomenon, both in its causes and in its effects. As such, it requires collaborative international strategies. International response to climate change has been materialised in two agreements: The Framework Convention of the United Nations on Climate Change, adopted in 1992 and the Kyoto Protocol of 1997. In Europe, the fight against climate change is a priority within the Sustainable Development Strategy, and it reinforces the intentions to fulfil the commitments of the Kyoto Protocol, which expires at the end of 2012. The *First European Programme on Climate Change* was approved in March 2000, and a number of directives emerged further, with the objective of reaching an 8% emissions reduction between 2008 and 2012, in comparison with the 1990 levels. In 2005, The European Union approved the *Second European Programme on Climate Change*, with the aim of examining the progress made, and this document emphasizes the necessity to reduce

emissions in transport, to increase energy efficiency, and the base for the adaptation to climate change.

According to the Inter-governmental Panel of Experts on Climate Change (IPCC), Spain is one of the countries which will be affected by the consequences of climate change. As a European Union member, Spain is actively participating in the international climate negotiation processes and it has also defined general strategies, plans and policies to fulfil its international commitments to reduce GHG emissions. In 2007 the *Spanish Strategy for Climate Change and Clean Energy*, *Horizon 2001-2012-20*, was approved. It contains an Urgent Action Plan which, together with the Spanish Energy Efficiency and Energy Saving Action Plan, constitutes the general and sector-by-sector strategy for reducing the consumption of fossil-fuel energy, increasing energy efficiency, and promoting renewable sources of energy. Currently, the Autonomic Community of Galicia follows the same strategy, adapted to local and regional characteristics.

The University of A Coruña is a public, and relatively new, university. It was founded in 1989 and it has two campuses: A Coruña (with six different spatial locations: Maestranza, Riazor, Elviña, Zapateira, Bastiagueiro and Oza) and Ferrol (with two spatial locations: Esteiro and Serantes). Its staff today consists of 1,513 faculty and 760 administrative and service personnel. It has 24,554 students divided between the two campuses.

The University users, both staff and students, with their patterns of energy and materials consumption, waste generation and organization-related mobility, have a considerable impact on the environment in terms of GHG emissions. Since its foundation, UDC has developed research on issues related to sustainable development and the environment, through research

groups working in Environmental Economy, Environmental Law, Environmental Chemistry and Biology, Environmental Education and Environmental Psychology. In order to integrate environmental knowledge from all these fields, in 1997 the University´s Environmental Institute was created. This institute generated several initiatives that were managed by the Vice-Rectorate for the Environment and Infrastructure, and later became the Office for the Environment. All these institutional structures, together with the work of several research groups support multidisciplinary research on environmental behaviour and on the development of strategies to connect research with public policy within the Network of Municipalities for Sustainability. In 2005, the University also became part of the Conference of Rectors of Spanish Universities (CRUE), within which it coordinates a work group on urban planning related to campus infrastructure.

The University has established an action strategy for sustainability at the institutional level, and it has specified it in a general strategy and a series of sectorial plans for each domain (e.g. waste, mobility etc). It has also created the Office for the Environment, which is in charge of promoting and implementing measures and campaigns to reduce the greenhouse gas emissions of the University and to promote pro-environmental behaviour among both workers and students. However, except for its appointed Director, who is also holding an academic position at the University and can only dedicate a limited part of his time to the tasks of the Office, it does not have own staff and can only work with a number of volunteers who are assigned every year among the students. Given the limited resources the Office has, it has achieved quite a lot in a relatively limited amount of time, by championing infrastructure change before the economic crisis which started to show its effects in 2010, and smaller-scale

measures and awareness campaigns since then. Among the policies that this Office has promoted, the following can be found:

- Installation of renewable energy sources for high-consumption buildings (such as the physical education building which has a year-round functioning pool), and for new buildings in general.

- Advances in green contracting

- Facilitation of bicycle use through accessibility enhancement

- Education and action campaigns for planting new green areas on the university campus.

- Installation of supportive infrastructure for paper recycling and of widely spread online procedures with consequent reductions of paper use.

- Installation of water fountains

- Installation of grey water re-use technology using biomass energy and fast intervention procedures in case of water escapes.

- Introduction of energy efficiency measures such presence-detecting sensors for lighting, or low-consumption light bulbs.

- Improvements in the campus public transport system.

The Office also publishes a Sustainability Report every year which documents advances and monitors progress and it has enabled an annual calculation of emissions and a calculation of the environmental footprint of the University. The main elements included in the calculation

of the Carbon Footprint (CF), which is expressed in hectors (HA) of forest that would be needed to absorb the CO2 emissions, are, in order of emissions percentage:

1) Mobility (43%).

2) Electricity consumption (25,4%).

3) Diesel fuel or heating fuel (12,6%).

The following figure (Figure 2.2.1) shows the contribution of each area to the overall emissions of the University:
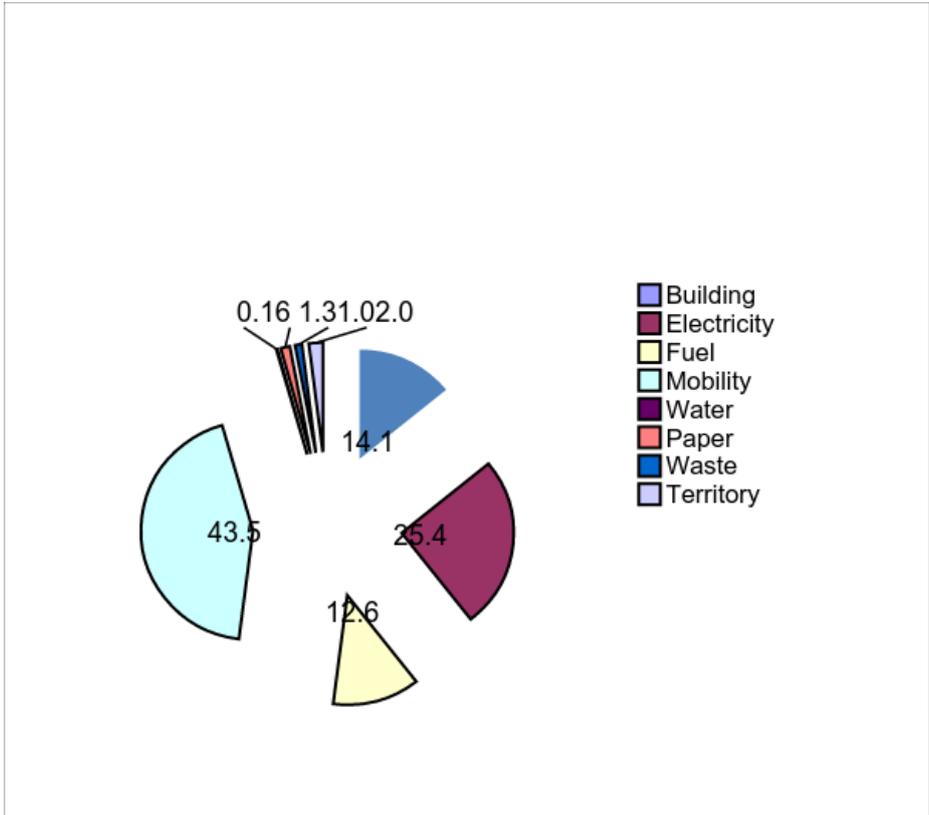
Figure 2.2.1. Contribution of each element to the CF of the UDC in percentages. Source: Garcia-Mira et al., 2011, Deliverable 2.2.

As it is easily visible, the domains of energy and mobility are responsible for the highest percentages of emissions at the University. Improving efficiency in these areas should thus be the focus of research and interventions. Emissions resulting from the consumption of water, paper and generation of waste only represent 2,5% of the total CO_2 emissions, but actions focusing on these areas are still important for their educational value, for raising awareness regarding the importance of environmentally-respectful behaviours and for their potentially large multiplying effect through students.

The results obtained through the use of an observational tool within the context of the LOCAW project have reached a series of useful conclusions on which the present research was built. First, they showed that not all environmental policies and practices that the University has adopted in the last year are observable for, or known by workers. The category of energy-related practices is the one where the highest discrepancy can be identified between the University´s environmental strategy and the perceptions workers have regarding the importance of these practices. Secondly, the perceptions of importance accorded by the University to environmental practices many times follow a different trend than workers´perceptions of importance. As a general trend, workers are perceived to assign more importance to environmental practices than the University as an institution. This is the case even in areas where the University has taken a series of important change measures such as the installation of renewable energy sources, and yet the observed practices do not match the perception of importance the University assigns to environmental practices in this area. That is to say that in spite of the fact that workers observe the existence of a series of policies and practices that have been undertaken by the University in the area of mobility, they do not

perceive the University to assign importance to these practices. The fact that the University is not perceived as assigning importance to environmental practices potentially has far-reaching implications over the pro-environmental behavior of workers and students. Previous research has indicated that perceiving the organization as assigning importance to pro-environmental practices contributes to an organizational climate that supports pro-environmental behavior (Norton et al., 2014), as well as an organizational focus that places sustainability concerns as central, thus influencing both leaders´behavior and the formation of a sustainable organizational culture (Norton et al., 2015).

This baseline diagnosis of the main sources of greenhouse gas emissions at the University, together with the evaluation of the importance assigned to different types of practices pertaining to the three categories of energy, waste and mobility, were used as a point of departure for a more in-depth exploration of the factors contributing to either promoting or hindering pro-environmental behavior of both workers and students at the University. This exploration is carried out across four studies, as outlined above, and is geared to answer the overall question of what are the requirements for the university to become an organization that supports the adoption, learning and transference of pro-environmental behavior as well as to become a context in which workers and students go beyond mere adherence to environmental policies, to take an active role in the transformation of workplaces, by becoming motivated to meaningfully engage with processes of transformation towards sustainability, through identifying, proposing and carrying out creative solutions to environmental problems in organizations.

3. Study 1: Identifying perceived barriers and drivers to sustainable practices

In order to investigate the extent to which the existing University policy supports pro-environmental behavior of both workers and students, and creates an environment in which environmental initiatives are supported, the first study is designed to answer two research questions:

Q1: What is the effectiveness of the existing university policy and how much is pro-environmental behavior supported? And

Q2: What are the barriers and drivers of sustainable everyday behavior at the University?

In order to answer these two research questions, an analysis was performed of perceptions workers and students have of existing barriers to and drivers of sustainable behavior at the University. Building on the diagnosis carried out within the LOCAW project, that provided information on which environmental practices are observed by workers, and the perceived importance attributed by both the university and workers as a collective, an exploration of the perceptions of most significant barriers and drivers of pro-environmental behavior was

undertaken. Understanding the different barriers and drivers workers and students perceive and the ways in which these are interrelated is important in order to comprehend what is effective in the efforts of the university to become more sustainable, as well as to identify the factors that might hinder or support such efforts. Study 1 serves as a baseline diagnosis of factors that influence both the adoption of pro-environmental behaviors promoted by the university as well as the motivations to design and carry out initiatives that might improve the environmental performance of the organization as a whole.

Two focus groups, one for each of the university´s campuses were carried out to identify perceptions of barriers and drivers to pro-environmental behavior at the University.

3.1. The focus group methodology

Focus groups are social situations where people discuss issues concerning their own experience. In general, focus groups have the purpose of collecting information, points of view, opinions and meanings attributed to a specific object of interest. They target the quality of the information collected rather than the quantity. Although focus groups were first developed in consumer psychology and market research, they have found application in many other domains of applied social psychological research (e.g., in the fields of education, health, work, environment), as instruments that might support the use of other qualitative and quantitative tools (single interviews, observational methods, surveys), and sometimes as self-standing tools for qualitative research.

Focus groups are research tools that allow access to people's attitudes, beliefs, values, and also to the meanings that individuals attribute to their life experiences in situations of social interaction. Focus groups can provide information on the understandings groups draw upon to reach their judgments (Bloor *et al.*, 2001). They start from the assumption that for some issues, and especially subtle ones, people do not know how they feel and they first need to listen to others in a relaxed setting to be able to thoughtfully give their answers to a set of questions. A good focus group will provide a wealth of information on the issues studied but the discussion will be free flowing. Given that the connections between patterns of time-use characterizing different lifestyles, time-scarcity and pressure, consumption and wellbeing are not well studied so far and entail complex relationships, focus groups are particularly suited for our purposes. Their purpose is to explore these relationships by tapping into the everyday experience of a group of people, thus providing the basis for further exploration by means of surveys at both regional and case study levels.

The strength of the focus group method lies in the interactive development of ideas, as the opinions of others stimulate further thought and ideas in all the members.

The strength of focus groups lies not in quantitative analysis or in making statistically probable generalisations but in the fact that focus groups can reveal evaluations, opinions, and mechanisms that exist in the target population and they can provide a deep and differentiated characterization of these phenomena (Vicsek, 2010).

Focus groups may be used to explore new research areas, to explore a topic that is difficult to observe (not easy to gain access), to explore a topic that does not lend itself to observational techniques (e.g. attitudes and decision-making), to explore sensitive topics, to collect a

concentrated set of observations in a short time span, to a certain perspectives and experiences from people on a topic (particularly when these are people who might otherwise be marginalized) (Cohen and Crabtree, 2006). They are a highly versatile method, which can be used both to support the development of surveys or interview guides and to clarify research findings from other methods. Given the limited research available on the determinants of pro-environmental behavior in large-scale organizations, and especially in educational ones such as universities, the focus group method was chosen as an appropriate tool for the first exploration of factors influencing pro-environmental behavior.

3.1.1 Description of the focus groups

Two focus groups were carried out in the two campuses of the University, including a mix of academic and administrative staff, as well as students. Both people occupying leadership positions on environmental issues as well as people representing unions within the organization were included. Students that held positions of formal representation in the organization were also included.

A guide for the focus group was defined to be followed by the researcher and an assistant who supported the development of the focus group. As the case study was part of a larger comparative research project, an initial guide was developed through a collaboration of four research teams, under the leadership of Italian environmental psychology researchers. Although this research guide was taken as a starting reference, the focus group guide for the University of A Coruña was developed to explore issues that were of unique relevance for the

case study organization (see Box 3.1.1.1). The guide was used as a tool for orienting

discussion, but space was also allowed for following up themes that spontaneously emerged

during the discussion and that were relevant for the research questions.

Box 3.1.1.1.: Discussion track for the focus groups.

General topic*: Sustainable everyday practices in the workplace*

*(Un)Sustainable behaviours***:** the moderator introduces the general objective of the focus group and asks participants to first think about behaviors at the university that are relevant from an environmental point of view.

General questions

1)   What do you feel has been done in your organization to advance sustainability? What has been successful and what is still missing?

Consumption of materials and energy

2)   Let´s take a look at the area of consumption of materials and energy. What types of behaviours do you perform in the University that have an environmental impact, in your opinion?
3)   Thinking about the successful policy measures and practices, what have been, in your opinion, the main drivers behind them?
4)   Thinking about those things that are still to be achieved, what are the main barriers for their implementation?
5)   In your opinion, whose responsibility is it? What can workers do to promote more sustainability in the workplace?

Waste generation and management

6)   In which way the organization manages waste production?
7)   What are the drivers of successful measures and the barriers to advancing in certain areas of environmental policy?
8)   Is it an individual or and organizational matter? Which kind of materials can be recycled in your organization? Which of these are actually recycled? Who is responsible (or should be responsible) for this?

Organization related mobility

9)   Which sustainable practices are in place to reduce unsustainable mobility related to the University? What about the reduction of occasions/quantity of mobility? (For instance, is it possible to avoidh travels tanks to on-line conferences with far away colleagues?) What about changing the quality of organization-related mobility? (For instance, using a car-sharing system, organizational buses, hybrid or gas organizational cars, using public transportation instead of private car for home-work movements, etc).
10) Considering the recent failure to achieve the recognition as a sustainable campus, how do you think the University should be reconsidering its plans for mobility?
11) What are the main barriers for advancing in this area? What are the main drivers?

General evaluation

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12) Thinking about achieving a more sustainable organization in general, what do you think are the main opportunities the University has?
13) What are the main tensions and contradictions you identify?
14) What do you think about initiatives/informations about sustainability and sustainable behaviours from that the university provides? In which way they should be enhanced or improved?

Final considerations

15) Participants´proposals to improve pro-environmental behaviour at the University

3.1.2 Sample

Focus groups were carried out on campus premises, one in the Campus of A Coruña, at the headquarters of the Social Psychology Laboratory, in the Faculty of Educational Sciences, and the other in the Campus of Ferrol, the second campus of the University, in the Meeting Room of the ViceRectorate. In order to select a suitable sample for the objectives of the focus groups, an initial list was compiled that contained all persons that occupied positions of responsibility related to the three areas of practices of interest for the study. Both staff in political (elected) and non-political (administrative) positions were listed (resulting in a number of 20 members of staff). Besides staff, a number of students that held representative positions on both campuses were identified and invited to participate in the study. Student representatives were also invited to participate. A number of 14 members of both staff and students accepted the invitation to participate, eight for the Campus of A Coruña and six for the smaller campus of Ferrol. Participants were not offered any payment or incentive for their participation.

Members of the focus groups included senior members of the university with responsibility over infrastructure and maintenance decisions, environmental and economic policy, and general budgetary ad oversight functions. They also incuded a few key union representatives.. Again, people that were likely to hold sufficient information and knowledge on how the three

areas of interest were organized at the University, of the measures undertaken so far and of the problems encountered in the environmental strategy implementation were targeted, in order to achieve a good diagnosis of the situation at the University.

Both focus groups were carried out in May of 2011, and had a relatively good gender distribution: the A Coruña focus group had a composition of three female participants and five male, while the Ferrol focus group achieved an equal distribution of three female and three male participants.

3.1.3 Procedure

Participants received an invitation asking them to participate in a focus group, which briefly explained the objectives of the project. They also received an informed consent form, where they were told of their rights as participants and provided all the necessary information about withdrawal conditions. Each focus group lasted about an hour and a half and both were audio recorded. They were led by one researcher and an assistant, who was in charge of taking notes and managing the organizational aspects of the focus groups, such as collecting the signed informed consent forms, and managing the audio recording. The analysis was performed directly on the audio file, by using the qualitative analysis software Atlas.ti.

3.1.4 Data analysis

The results of the focus groups were analyzed using principles of grounded theory. Grounded theory is an approach for collecting and analyzing qualitative data, and it revolves around the progressive identification and integration of categories of meaning. The term grounded theory refers both to the method by which the categories are established and the links and relationships between them are established, but it also refers to the end-product of said method – an explanatory framework for the research phenomenon (Willig, 2008). Grounded theory is meant to facilitate the generation of new contextually-grounded theories that emerge directly from the available data, without being dependant on pre-existing constructs, categories or theories.

It is worth noting that due to its flexible, open nature, grounded theory is an equally valid approach for theorizing contextualized social processes (whereby the researcher attempts to identify and map said processes, notable relationships and their consequences for participants) or for mapping an individual's categories of experience (a more psychological approach, where the researcher focuses more on the texture and quality of the participant's perspective rather than its social context, causes or consequences).

Both focus groups were audio-taped and then analyzed using ATLAS.ti. All gathered materials have been subjected to thematic content analysis procedures (Braun and Clark, 2006; Ryan and Russell Bernard, 2003). The package ATLAS.ti has been used for data analysis. All the material analyzed was stored in electronic format. The ATLAS.ti software allows the selection of units of meaning (so-called "quotations") directly from the audio archive, and these can be assigned specific codes, which capture the theme of each quotation. Each code will in the end have several quotations assigned to it, thus allowing the researchers

to identify the most commonly emerging themes. Codes can be connected among themselves through logical relationships; families of codes can be constructed for each super-ordinate category of meaning, thus providing a map of themes and relationships emerging from the analyzed material. Each code was defined using the structure: *"Conceptual area_specific theme",* to facilitate their posterior grouping. Each code has two numerical indicators associated to it: the number of quotations assigned to a particular code ("*Grounded*"); and the number of relationships a code has with other codes ("*Density*"). Thus, the highest the number of assigned quotations and associated density, the more central the code is as a theme in the analyzed material (either from documental sources, interviews, or focus group discussions).

3.1.5. Results

The overall content of the focus groups could be described through the following five conceptual areas:

1. Attitudes (evaluations made by the participants on different aspects of the organization, related to the categories of practices studied – consumption of materials and energy; waste generation and management; and work-related mobility)

2. Values (perception of existing environmentally-relevant values within the organization and in the larger society; also includes observations about missing values, that would positively influence everyday practices related to sustainability).

3. Barriers (perceived obstacles in transforming the organization into a more sustainable one and reducing GHG emissions)

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4. Best practices (perception of the existing everyday practices in the organization. This category was designed to include all practices perceived as being present in the organization – both positive and negative)

5. Responsibility assignment (attributions of responsibility for the existing situation within the organization)

Attitudes regarding sustainability-related practices in the organization

In what concerns attitudes, the general orientation is that there are lots of things that can be improved within the University and discussion themes centre on the causes of unsustainable behaviour. A general conceptual network concerning the dimension of attitudes is provided in *figure 3.1.5.1*. Attributions of causality can be grouped in two different categories: those pertaining to the individual and those related to the organization. In the category of individual causes, university members consider that the costs of performing pro-environmental behaviours are important barriers affecting unsustainable behaviour in the workplace. Considered costs refer to both financial and effort categories. The code *"Causes of unsustainable behaviour are related to comfort and personal cost"* has the highest number of associated quotations in this family (13 associated quotations) and a density of 3 (the number of links that connect this code to other codes). Comfort refers to the effort needed to perform a certain behaviour and personal cost makes reference to the economic dimension of behaviour. That is, members of the university consider that behaviour in the workplace is less sustainable than behaviour at home, because unsustainable behaviour has no financial consequences at work, while at home it is reflected into a higher level of spending. The only

other individual-level factor mentioned is: *"Resistance in elderly staff to learn new technologies"* (4-2). Saving money is thus considered a main motivation of energy-saving behaviour and we can already note that hedonic motivations (related to comfort and convenience) are also considered important. The motivation for financial saving could explain energy-saving behaviours in the household, but it would not explain mobility behaviour, as car-use is generally more costly than using public transportation, if total costs are considered. Hedonic motivations might explain both energy-consumption (e.g. to have a certain comfortable temperature in the home), (un)sustainable mobility options and poor waste management practices, where facilities are not adequate.

Another signalled theme has to do with causes of unsustainable behaviour that are related to organizational decisions. These are expressed as measures that the university could take to ensure a reduction of CO_2 emissions, and they refer mostly to physical/structural factors such as changing the way activities are performed within the university (such as classes or participation at conference) by "*Promoting the use of information technology to reduce mobility"* (5-1), or *"Need for a change in heating systems to avoid waste"* (3-1). In general, the perception is that the university is not doing enough in terms of sustainability, and this is expressed in the code *"Existing measures are not sufficient"* (3-2). Also, participants perceive that the university could take a series of relatively easy measures that could have significant environmental impact, by using internal resources to improve behaviour-facilitating conditions.

Another body of content in this family of codes refers to the interaction between top-down decisions and organizational context elements on the one hand, and the individual on the

other. Participants acknowledge that existing practices are a result of the interaction between top-down conditions and individual behaviour *("Practices are dependent on interaction between top-down conditions and individual behaviour within them"*) and that responsibility for change belongs both to the university as an institution and to individual members ("*Shared responsibility between university´s government and individual users*"). The last code has 3 quotations associated to it and a density of 1. On a deeper level of analysis, one can observe that in spite of the observation that practices are a result of the interaction between contextual conditions and individual factors determining sustainable behaviour, responsibility is mainly attributed to the university as an institution: more codes refer to what the organization could do than what the individuals within it could change in their behaviour: *"Sustainable solutions should be provided by using existing internal resources"* (1-1); *"Small measures for significant improvement"* (2-1); *"Necessity to educate elderly staff in the use of Moodle platforms and other technologies"* (2-1). This is also suggested by indicating that individuals do hold pro-environmental attitudes but they do not get translated into practice within the organization *("Pro-environmental attitudes are individual and not translated into institutional practices"* – 1-1). Participants also refer to sustainability as a highly complex issue within the organization that require "virtuous" interactions between structural and individual elements.
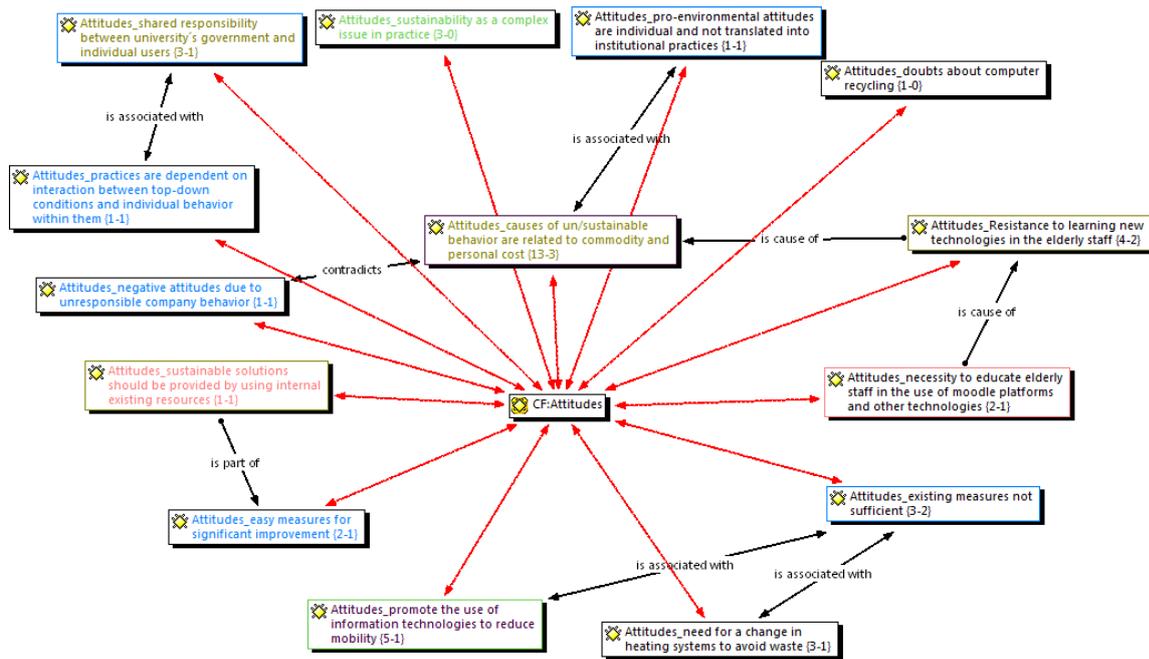
Figure 3.1.5.1. Conceptual network of attitudes

Values influencing (un)sustainable practices in the university

One of the emerging themes in this category is related to the conflict of values that affects

sustainable practices. A general conceptual network concerning the dimension of values is

provided in *figure 3.1.5.2.* In the area of work-related mobility, one of the highest impact

activities of university members is participation in conferences. Although there are several

ways in which this can be reduced, such as organizing virtual meetings or reducing the

number of conferences attended by using criteria of relevance to one´s own work and

objectives, transforming these into practice is difficult because there are two values coming

into conflict: pro-environmental values and the value of direct contact with other

professionals of one´s academic field, which ensures opportunities for collaborations in research and other academic projects.

Another theme refers to the values that constitute a barrier to the implementation of sustainable practices. The societal value of consumerism is mentioned as an obstacle ("Consumerism as a barrier to sustainability"), which is translated at the organizational level into valuing immediate economic gain and using performance measures based on profit and not on sustainability. This results in avoiding decisions that require high investment and have a delayed return in economic terms, such as investments in infrastructure.

It is signaled that the university as an organization has the right values and that "organizational sensibility with sustainability" (4-2) exists. Nevertheless, in order for individuals to adopt practices that lead to a reduction of CO_2 emissions and to develop pro-environmental values, education and awareness are considered very important. The code *"Importance of environmental education and awareness"* has the highest numbers of quotations associated to it in this family (18 quotations). There seems to be a contradiction here: in spite of the fact that the causes that are most commonly mentioned as being responsible for implementing sustainable practices in the organization are attributed to the organization itself, it is considered that the university has the right values. The causes for the perception of the university as not doing enough thus seem to lie elsewhere and this needs further exploration. Thus the question is: *if the university has the right values, what stops its efforts to promote sustainable practices in the workplace?* The fact that individual values are not considered the right ones or to be sufficient might indicate:

- an attribution of responsibility to the individual workers in behaving pro-environmentally in the workplace;

- the lack of sufficient take-up by workers of pro-environmental practices that the University as an organization promotes;

- the lack of bottom-up pressure from University members on the organization to advance its environmental policy implementation while economic circumstances are difficult.

Differentiating between these possible causal links that workers might make in their evaluation of the obstacles and drivers of sustainable behaviour in the workplace is impossible at this stage. More in-depth exploration of the causes of (un)sustainable behaviour is required.
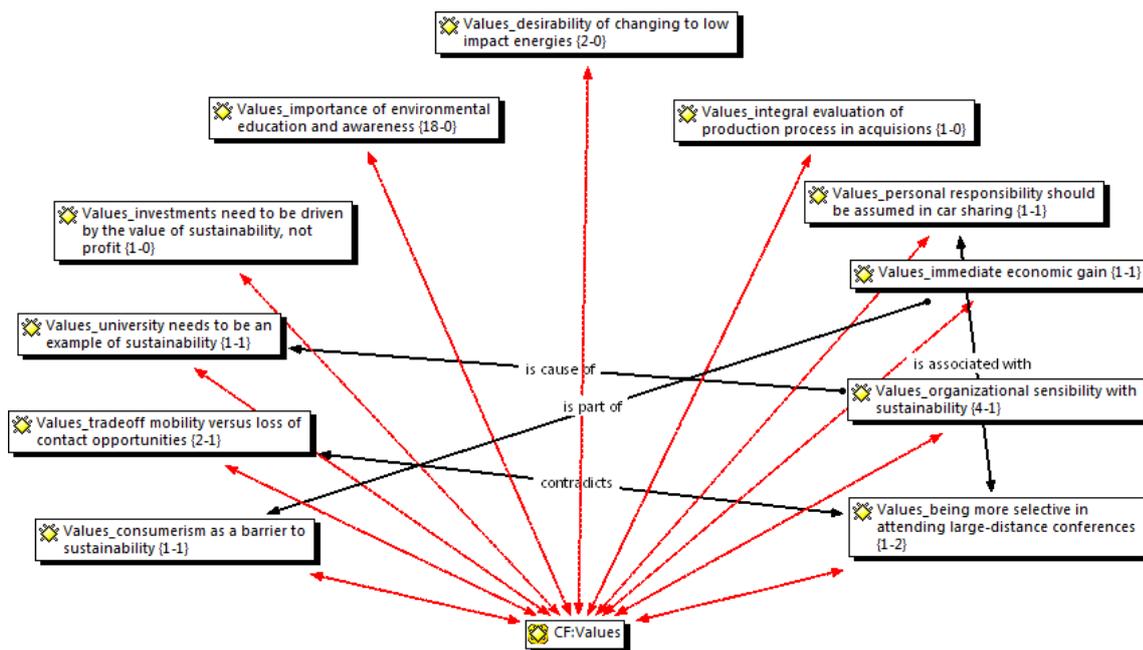
Figure 3.1.5.2. Conceptual network of values

Diagnosis of practices in the organization

The general perception of practices within the organization is that there have been advances in terms of sustainability but also that there are still a lot of things that are missing or are inappropriate. A general conceptual network concerning the dimension of practices is provided in *figure 3.1.5.3.*

Among the good practices, in the *area of energy and resource consumption*, the following are mentioned: "Fast intervention in case of water escapes" (2-1); "Circuit for re-use of grey waters using biomass energy" (1-1); "Low-consumption light bulbs" (1-1); "Paper consumption is being reduced" (3-0); "Internal notifications via email" (1-1); "Exams use recycled paper" (1-1). *In the area of organization-related mobility*, among the good practices, the following were mentioned: "Bicycle introduction was successful" (2-1); "Campus transport significantly improved in the last years" (1-1). Waste is not mentioned here and the most likely explanation for this omission is that waste management is externalized in the university and an independent company handles it. It is likely that practices related to waste are not perceived as being part of the university or that there is less knowledge about how this is handled and what practices exist in this area.

The number of quotations in these codes is very low and many of them are mentioned just by one or two people in the focus group, either a representative of the management team or the unionist. This is consistent with the fact that university members, even where they exist, do not perceive sustainable practices in the university. This might again mean that sustainability-related policy is not well communicated in the university.

Among the practices considered unsustainable or missing, the following were mentioned: *"Abusive use of lights"* (1-6); *"Blinds are kept down"* (1-1); *"Lack of centralized energy switch-off at night"* (1-1); the suggestion to *"introduce light switching on and off with sensors"* (2-1); and *"low paper re-use"* (2-1). All of them belong to the area of energy and resource consumption and focus mainly on energy use.

The area where most advances are visible for university members is in reducing the consumption of paper due to the introduction of computerized procedures in academic and administrative activities in the university. Being skilled in managing technology is considered a characteristic of academic staff and it is mentioned as a driver in achieving a higher degree of reduction of resource use.

Also, there is recognition of the fact that some practices depend on the coordination and cooperation between the university and other external institutions, especially in the area of sustainable transport.
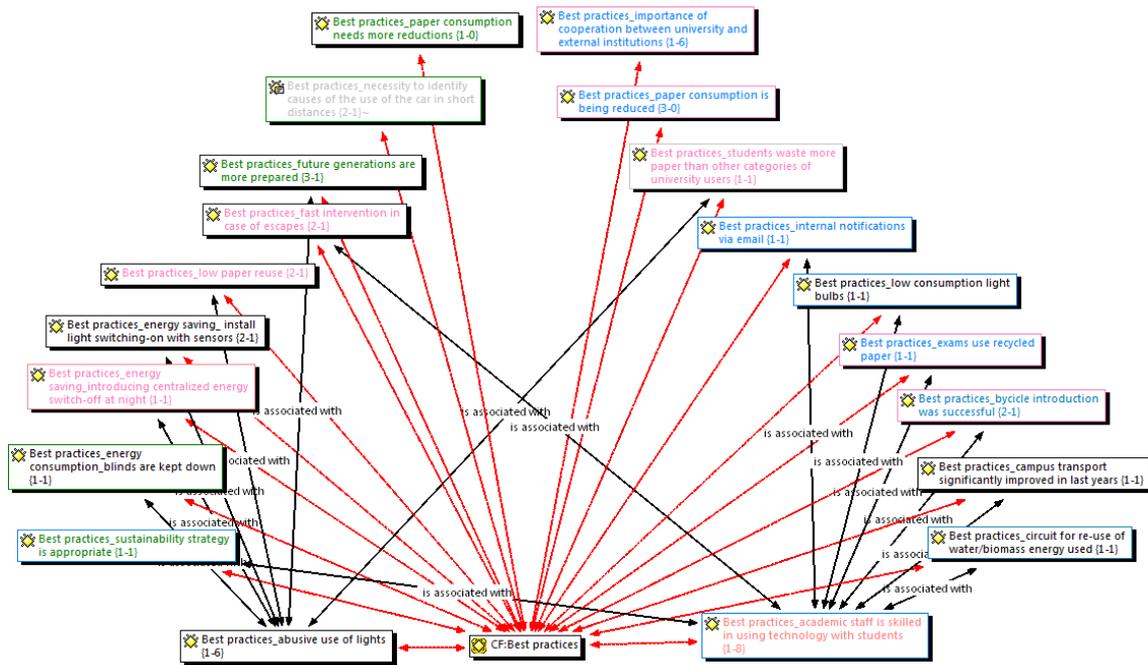
Figure 3.1.5.3. Conceptual network of practices

It seems that practices that have been implemented most successfully and are known by workers tend to refer to the saving of paper and water, and less so to the domain of energy and resource consumption. There are several potential explanations here: one is that these are low-effort, easy to implement practices; the other would be that these have become more widespread and known among workers partly because of their familiarity, and partly because the university might have placed more emphasis on these. However, it is obvious that there are other important areas in which practices are either inexistent or not observed by workers – *such as in the area of mobility, waste generation and management or in the "greening" of cafeterias and restaurants on university sites.*

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Good practices can be used in the University strategy, if made visible, as a way of signaling the University´s commitment to sustainability, on the one hand, and as a mechanism for increasing perceptions of behavioural control such as self- and collective efficacy of workers, if presented with appropriate behavioural feedback, within a strategy of signaling advances made by the University community in reaching sustainable goals. A strategy of good practice promotion could also be used as a way to generate motivation for further, more difficult pro-environmental behaviours, in the style of the "foot-in-the-door" persuasion techniques that experimental research has shown to be effective. Promotion of good practices, if coupled with information of percentages of workers undertaking them and evolution of their uptake can also contribute to the creation of social norms that support pro-environmental behaviour.

Responsibility attribution for the existing practices

When the situation in the organization is analyzed, members attribute responsibility for the existing unsustainable practices mostly to the organization and to external factors and institutions, and there is almost no reference to individual responsibility of agents within the university. A general conceptual network concerning the dimension of responsibility is provided in *figure 3.1.5.4.*

One of the main failures of the organization is considered to be the lack of visibility and dissemination of the sustainability strategy that the university has (the code has 7 quotations associated to it and a density of 1). This is considered the responsibility of the institution and thus responsibility for generating compliance with it and promoting sustainable individual practices is attributed to the university. The organization is also considered responsible for not

adopting decisions that would increase sustainability and would not have high costs ("Top-down decision-making for high sustainability" – 7-1).

A lack of coordination between different university departments and personnel categories is also considered to be a main failure attributable to the organization and thus to the level of top management. There are several codes that refer to this, such as "Need to approve an integrated sustainability plan" (5-1); "Plans for better streamlining" (1-1); "Lack of coordination among personnel categories" (3-1); "Organize social participation platforms" (2-1). All of them refer to the need of organizing internal processes in a coordinated way to ensure sustainability.

Besides the organization itself, structural factors such as cooperation with external actors are also considered responsible for some of the unsustainable practices in the workplace. People mention, for example, the difficulties in cooperating with external institutions such as local government in areas of transport or campus infrastructure or with companies to which services have been externalized: "Necessity for a better public transport system" (7-2); "Difficulty of cooperation in waste management with external actors" (3-1) or "Externalized service makes control difficult" (2-1).

In spite of these difficulties, the university is considered responsible for controlling the input of materials. The code "Control input of materials" has 2 quotations associated to it and a density of 10, suggesting this as an area where significant improvement can be achieved in the organization in terms of sustainability. This is the case because this code is associated with most of the other codes that refer to the responsibility of the university and especially to its level of top management where the most important sustainability-related decisions are made. This is an important node of connection among codes.

Other structural factors that are considered to exert influence on organizational sustainability refer to the system of environmental laws and norms. Thus, it is considered that "societal legislation should constrain unsustainable behaviour" (1-1) and that "external norms restrict decision-making" (2-1) at the organizational level.
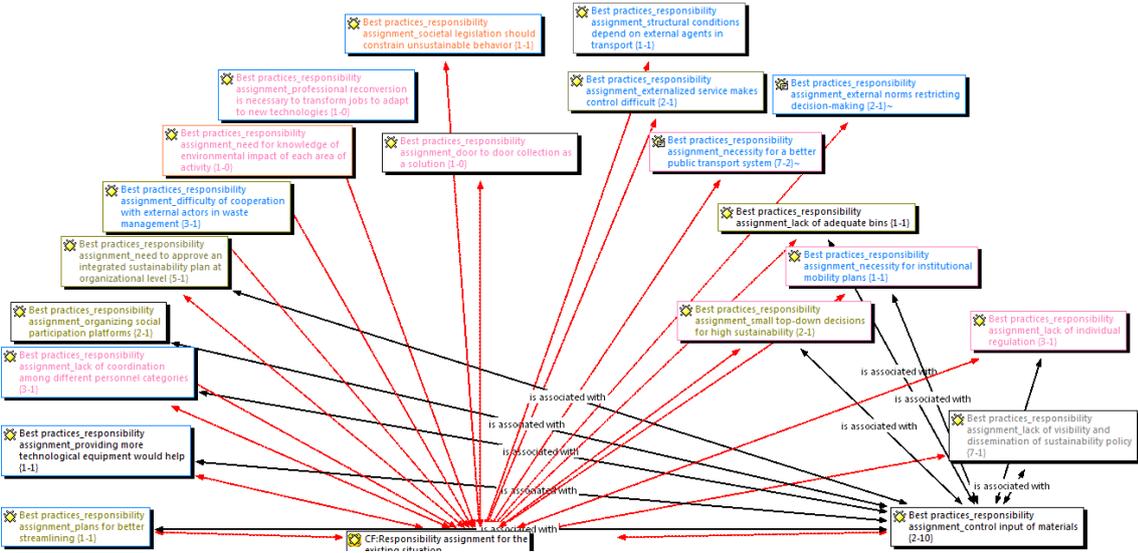
Figure 3.1.5.4. Conceptual network of responsibility attribution for existing practices

Assignment of causality and responsibility is likely to have a direct impact on the behaviour of workers. If they perceive the organization to be responsible for promoting pro-environmental behaviour, they might not be willing to do anything themselves or might underestimate the role of workers in getting a public organization like the University to act on the workers' suggestions and expressed values and desires (especially as the university is governed democratically). If the workers consider individual factors to be responsible for pro-environmental action, they might postpone action to a time when workers' values and attitudes might change. The analysis of the focus group data provides a mixed picture in

which most responsibility seems to be attributed to the organization, which might result in workers not feeling motivated to carry out pro-environmental behavior or promote initiatives that might change practices at the University. When individual responsibility is mentioned, it tends to be in general terms and no reference to personal responsibility is consistently made. When it is referred to, it seems to indicate a perception that colleagues do not adopt sustainable behaviors at work, which indicates that social influence might have a negative effect on sustainable behaviors.

Barriers in achieving a more sustainable organization

There are many references to barriers in the focus groups. These barriers are again related to the organization, on the one hand, and to structural factors external to the university, on the other. A general conceptual network concerning the dimension of barriers is provided in *figure 3.1.5.5.*

Among the barriers related to the organization itself, two categories can be identified: one related to *Structural/physical conditions*, and the other related to *Individual factors.* Belonging to the first category, university members mention Building characteristics (3-1) acting as constraints to sustainable practices, "Old installations" (2-1), "Lack of student residences" (2-1), and "Constructing the university buildings in different places in the city" (1-1). The first two codes pertain to the area of energy consumption and the last two, to the area of organization-related mobility.

When talking about infrastructure, subjects mention cost as a major barrier in creating conditions for a low carbon organization. Thus, cost is mentioned both in relationship to new

installations ("Initial cost of new installations" – 2-1), and to adaptation of buildings ("Cost of adaptation of buildings acts as constraint" – 2-1).

When talking about structural factors external to the university acting as barriers, most references are to those affecting organization-related mobility. Thus, it is considered that "Urban design limits bicycle use"(1-1), "Local climate restricts bicycle use" (2-1), and the "Geographic dispersion of the population" (1-1) is considered a limitation. These codes refer to a few characteristics of the city and the area in which the campus of A Coruna is situated. It is situated just at the outskirts of the city and the main access to it is from a major highway. Local climate includes a dominance of rain and windy days which makes bicycle use more difficult. And Galicia, the province where the city of A Coruna and the campus is situated, is characterized by high dispersion of population, with small communities being the norm, which makes the organization of effective public transport more difficult. However, it seems these elements are part of a local discourse on why sustainable transport is not adopted more widely. A closer examination would indicate that geographical dispersion and local rainy climate might be an issue in other regions of Europe where multi-modal alternative transport has been put into place to make sustainable mobility possible. The repetition of these discursive elements, however, limits the options perceived by university workers in terms of measures that could be implemented.
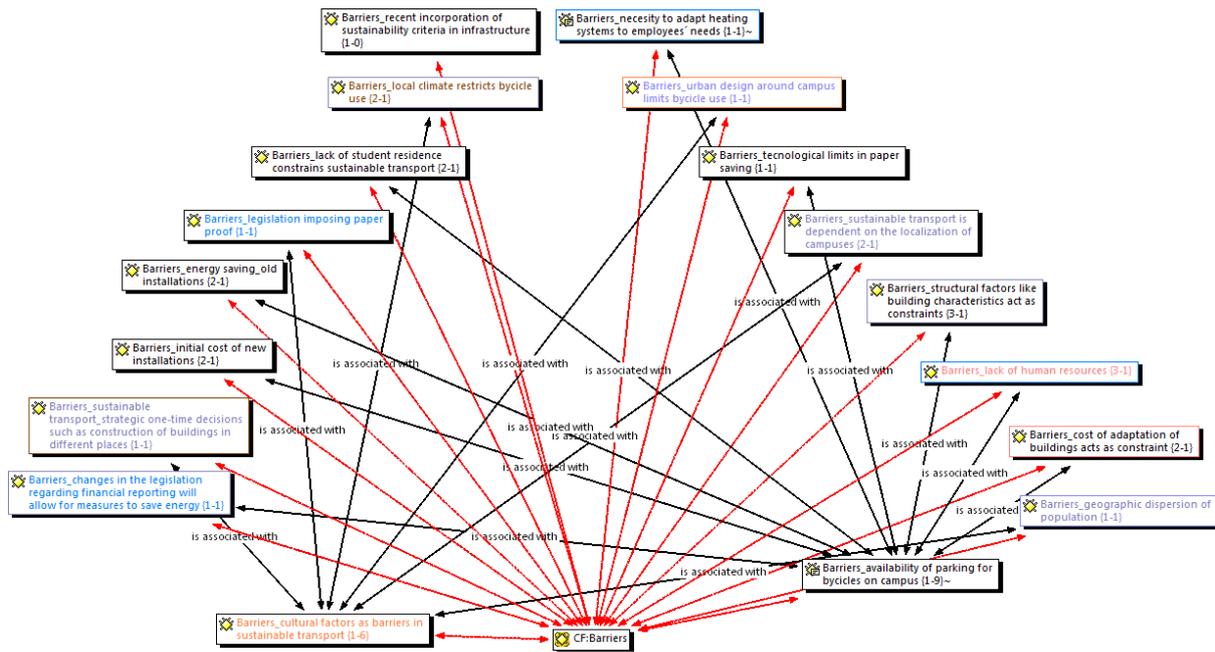
Figure 3.1.5.5. Conceptual network of barriers in achieving sustainability

3.1.6 Discussion

Five code families were established: a) attitudes; b) values held by university members; c) good practices, including both observed and lacking sustainable practices at the university; d) the attribution of responsibility for existing practices; and e) the existing barriers or obstacles in reaching a more sustainable organization. Codes and code families were derived inductively from the contents of the focus groups, using the principles of grounded theory in the analysis of the data.

Several aspects can be concluded from the focus groups. The larger environment in which the University exists does not seem to be too supportive of pro-environmental efforts. The surrounding environment has an influence on University practices both through creating a

certain physical and normative context, through the existing laws and regulations, the behaviour of other organizational actors such as the municipal government who has competences over areas such as the organization of public transport and certain mobility and waste infrastructure, and also through the embedded societal values and attitudes that workers and students bring with them and which need to be taken into account if the University is to become a key frontrunner in educating and promoting radical changes in behaviour and lifestyles. In terms of pro-sustainability values, it seems that the surrounding culture is favorable to practices such as the dominant use of private car, and gain and hedonic motivations seem to govern both home and work behaviour more than normative considerations. Although it has been argued that these motivations need to support contextual normative motivations to strengthen them (Steg and Vlek, 2014), it is also worth mentioning that the strengthening of these motivations and the tradition of pro-environmental campaigns insisting on low-effort behaviour or ´doing simple things to save the environment´ can also be detrimental to promoting pro-environmental behaviour in organizations (Crompton and Kasser, 2010), as especially gain motivations are harder to support in public organizations. However, gain motivations can be supported through organizational rewards for pro-environmental behaviour, which could be granted collectively, thus also stimulating an appropriate level of team work and collaboration regarding pro-environmental practices. Gain motivations can be supported through reputational mechanisms such as providing tailored and comparative feedback to different University centers and departments in terms of their environmental performance. This needs to be accompanied, however, by a significant level of centre autonomy regarding the implementation of pro-environmental measures, as otherwise comparative feedback would only lead to perceived helplessness and a decrease in feelings of

self-efficacy, which would be detrimental to environmental goals. Measures to make normative motivations more salient are also necessary, as otherwise pro-environmental behaviour is not likely to be sustained in time, and possibilities for behavioural transference between home and work are significantly reduced. The University can make good use of normative motivations, as especially is academic staff tends to be well aware of the importance of the model they provide for the education of youth and society at large.

One of the tensions identified has to do with sets of opposing values at organizational level, with a trend emphasizing the economic performance of Universities translating into a tyranny of performance measures and leading to short-term thinking when it comes to high investments. Thus, the participants signal that decisions of high initial investments, even if efficient in the long term, are avoided. However, they also signal that the University community has the right values, and that this can be used in much better ways to overcome these tensions: first, the University can use more of its internal resources of specialized knowledge to promote pro-environmental measures that do not entail high costs and rely on voluntary behaviour. With its characteristics of innovativeness and relative autonomy, the University could be the perfect place in which voluntary provision of different types of sustainable practices could be the norm (e.g. one could imagine faculty in the informatics department creating a platform for carpooling for example, if sustainable objectives were a priority); secondly, a lot more is needed in terms of the communication and dissemination of its measures and good practices, as even the existing ones are not known by workers. This could support the generalization of a perception of the University according importance to sustainability, which in turn would contribute to the creation of a culture of sustainability,

proven to have an important impact on workers´ pro-environmental behaviour (Norton et al., 2015). The virtuous cycle that could be created could lead to organizational leadership and academic staff taking on pro-environmental behaviour, and becoming relevant examples for workers and students alike. This, in turn, could potentially stimulate more creativity and a pro-active attitude towards pro-environmental innovation from the bottom-up.

Cooperation with external actors needs to receive more attention as well. The University seems to find it hard to push other relevant actors to adopt the necessary measures and make investments in infrastructure that would support more sustainable mobility, for example. As identified in the standardized observational tool, practices such as reducing car use are not highly supported by workers either, which creates a situation in which breaking the vicious cycle might seem daunting and costly. However, the University is also considered a key player in the community and needs to identify a way in which such a role can be used to promote a will for change. Its respected role can contribute to such a position, and this research aims to further identify the types of mechanisms through which this could be achieved.

Finally, the most successful practices that are put forth as examples by participants mirror those that have been successes in the home, which seems to indicate that the University is not pushing for measures in domains of practice which are harder to achieve but have a higher environmental impact. A striking example can be found in the discourse on mobility, in which a series of arguments are repeated as barriers to sustainable mobility, such as the local weather and topographical conditions, which, although do contribute to sustainable mobility options requiring more effort, have been known to be overcome in places that have

established environmental objectives as a priority for public policy. Said differently, the University does not appear to be standing up to its role as a frontrunner, and the present research aims to identify the reasons behind this finding, and the possibilities for change.

4. Study 2: The role of structural and organizational factors in promoting pro-environmental behaviour in organizations

4.1. Introduction

Wider policy efforts following from this philosophy of effortless actions and ´everyone doing its bit´ have proven not to be sufficient to slow down the increase in GHG emissions and

some authors have argued that it might actually have created a socially-shared mentality of being expected to only do effortless things and not feeling further responsible for the effects of one´s patterns of consumption and emissions production (Crompton and Kasser, 2010). Organizations themselves, as it has been pointed out in the theoretical review to this study, have started to consider environmental responsibility as something more than an afterthought, mostly due to regulatory pressures and increases in citizens´ demands for environmentally-friendly practices (and sanctioning of organizations that do not endorse them). Furthermore, it has been argued that besides pro-environmental behaviour as part of work tasks, the environmental performance of organizations can be considerably enhanced if workers become an active part of the process of promoting sustainable practices in the workplace, as initiators of behaviours outside mandated tasks and actively involved in suggesting organizational changes that can be more far-reaching (Delmas & Petkovic, 2013). Besides the pragmatic considerations of organizational pro-environmental performance, the active involvement of workers in organizational change has been said to contribute to higher job satisfaction and higher commitment to commonly agreed-upon goals (Delmas and Petkovic, 2013). Supervisory efforts and costs are diminished as well, so there are tangible gains for organizations in promoting active involvement in organizational strategy-development, including environmental plans and policies. While private organizations are still slow in endorsing a culture of workplace democracy, public organizations can be adequate places for developing such cultures and become models in efforts to achieve sustainability.

Study 1 permitted the detection of trends in causality attribution and responsibility assignment for both further implementing environmental practices in the workplace and for explaining the

status quo of the organization. Workers tend to have a correct analysis of the barriers and drivers to sustainable behaviour, and a theoretically-accurate distribution of responsibility in some areas. However, possibilities for achieving emissions reductions through behaviour change are undervalued, which can be due to both a lack of knowledge regarding sustainability-promoting behaviours, a lack of organizational contexts and spaces for reflection on transversal policies for pro-environmental behaviour, as well as to a need to counter a feeling of guilt by transferring responsibility onto the organization. Differentiating between these requires further analyses of both organizational and individual determinants of pro-environmental behaviour in the workplace. Study 2 will undertake a more in-depth analysis of both structural and organizational factors affecting pro-environmental behaviour in the workplace, while Study 3 will look at individual determinants of pro-environmental behaviours among staff and students.

Study 2 aims to explore further the two research questions also investigated in Study 1, and to focus on a third research question:

Q3. What role do structural and organizational factors play in the facilitation or hindering of pro-environmental behaviour?

Study 2 aims to answer these questions by focusing on the analysis of the structural and organizational factors influencing pro-environmental behaviour at the University for different actors, as well as possibilities for pro-active efforts to introduce environmentally-related organizational changes. Structural and organizational factors were analyzed as reflected in the

perception of members in key leadership positions at the University. The type of factors included in this category included: European and national regulations; political, economic and social factors influencing the adoption of sustainability measures at the University, internal organizational factors and processes such as focus, elements of organizational culture and climate, the role of leadership behavior and support and social influence processes that might either support or hinder pro-environmental behavior of both workers and students.

4.2. Description of the interview method

In-depth interviews were carried out with members in key leadership positions. A semi-structured format was used, with a series of discussion themes formulated as open-ended questions. The first part of the interview was developed in a semi-structured manner, to allow free exploration of the structural and organizational factors influencing pro-environmental behaviour of both staff and students at the university. The three areas of practices described earlier were considered in the interviews. For orientation, a list of themes was drafted, with the interviewer then exploring interesting aspects that appeared in the conversations and that were relevant for the research questions of the present study. Themes targeted in the first part of the interviews were:

1. A general evaluation of the organization´s strategies and practices to reduce carbon emissions.

2. An identification of key factors that influence workers environmentally-relevant behavior in the workplace: especially the role of elements of organizational culture and climate, organizational focus, factors influencing the uptake of pro-environmental behavior and the development of pro-active initiatives in the organization were targeted.

3. The perceived role of economic, political and social factors in the possibilities and constraints of promoting sustainability in the organization.

4. Opportunities and obstacles for further advancing sustainable policy in the organization.

A list of more specific questions was also developed for the second part of the interview, although their order and content was followed by the researcher in a flexible manner, allowing the interviewee to go in different directions as appropriate, as long as the content of discussion was still relevant for the formulated research questions. These were:

1. Has your organization taken any measures for the reduction of GHG emissions through the minimization of the use of resources? What were this measures and how efficient would you say they were? Are they part of your daily practices?

2. What are the main obstacles that prevent your organization from taking more action for the reduction of greenhouse gas emissions?

3. Has the University used innovative strategies to reduce or offset their carbon emissions, or to encourage employees and students to come up with proposals for

improving the environmental performance of the university? If yes, how? If not, why not?

4. What role do external regulations play in the University policy to promote pro-environmental behavior?

5. Is there a perceived demand from internal and external stakeholders for a better pro-environmental performance of the University?

6. Is there any way in which your organization offers its employees the possibility to learn about issues of climate change and the possibilities for contributing to reducing the greenhouse gas emissions of the organization? (*For example*: are there any training sessions available, workshops, access to social networks which discuss the topic of environmental sustainability, virtual communities, and virtual platforms for the monitoring of carbon emissions).

7. Do you, as a worker, feel you could change sustainability-relevant organizational practices? In what way, or why not? What is supporting or hindering such efforts?

8. What needs to change for the University to become an organization that promotes pro-environmental behavior and creates an environment in which both workers and students can adopt this type of behavior and also become pro-active in proposing initiatives that can improve organizational performance in this area?

4.3. Sample and procedure

In total, nine in-depth interviews were conducted with key informers within the organization, during the months of November 2011 and January 2012. Key informers were considered to be high –level management staff in the positions relevant from a sustainability perspective (Infrastructure, Economic Planning, Office for the Environment etc.). In addition, one person in charge of the health and safety policy in the organization was also interviewed. This was considered appropriate due to the close relationship between risk prevention and environmental protection, especially in the area of waste generation and management, and also because of the high potential for intervention in the intersecting field between these two domains of activity. The President of the Social Council of the University, as a body that aims to connect the University with society and bring in the expectations and demands of the wider community into the organizations, was also considered relevant and included. The Social Council is in charge of the social responsibility strategy of the University and oversees that society's demands from the University are adequately represented and articulated. Representation of two different levels of management was ensured, at university and department level, representatives of both academic and administrative staff, and persons from the two main campuses.

Table 4.3.1. List of interviewees and their roles in the organization

No	People interviewed
1.	Vice-rector for Economic Planning and Infrastructure
2.	Head of Administration
3.	Deputy Director for Infrastructure and External Relations of the Polytechnic Superior School (Ferrol Campus)
4.	Vice-dean of Infrastructure of the Faculty of Educational Sciences (Elviña Campus)
5.	Head of the Risk Prevention Unit
6.	Director of the Environmental Office

7.	Head of the Maintenance Service of UDC, Urbanism and Architecture Service
8.	Head of the Structural Analysis Unit of the Research Support Service
9.	President of the Social Council of UDC

Each person targeted was contacted via email or phone and invited for an interview. When contacted by phone, a subsequent email was sent to them with a more detailed explanation of the objectives of the project and ethical forms, which included an information sheet and an ethical consent form. Thus every interviewee received the same information and documentation before the interview. The interviews lasted an hour and a half on average and were held either in the Social Psychology Laboratory of the University or in the interviewees' offices, when it was more appropriate. All interviews were audio recorded with the permission of the interviewees and the audio files were later analyzed with Atlas.ti, again following a grounded theory approach.

4.4. Results

A total of 179 codes were obtained, which were then organized into 17 families (*see table 4.4.1).*The data were organized in the following families, which identified the most important categories of content in the in-depth interviews:

Table 4.4.1. List of thematic units in the interview analysis

Families of codes
1. *Structural factors affecting everyday practices in the workplace*
2. *External cultural factors affecting everyday practices in the workplace*
3. *Economic factors affecting everyday practices in the workplace*
4. *Political factors affecting everyday practices in the workplace*

5.	*Social factors affecting everyday practices in the workplace*
6.	*Technological factors affecting everyday practices in the workplace*
7.	*Elements of organizational culture affecting everyday practices in the workplace*
8.	*Values present in the discourse of leaders*
9.	*Beliefs regarding environmentally relevant organizational practices*
10.	*Motivations of managers to promote pro-environmental policy*
11.	*Regulatory framework of environmental practices*
12.	*Human resources and role assignment*
13.	*Communication processes influencing everyday practices in the organization*
14.	*Environmental performance evaluation strategies*
15.	*Positive and negative practices in the organization*
16.	*Policy proposals in the three environmentally relevant areas*
17.	*Learning opportunities on environmental issues in the organization*

Structural factors affecting everyday practices in the workplace

The concept of structural factors is used here to define existing facilities and infrastructure and the way in which these can become either drivers or barriers for environmental behaviour and practices. With the exception of one code ("All new buildings have been built with environmental efficiency criteria in mind"), all codes refer to barriers. One of the most charged codes refers to campus buildings having been built with aesthetic criteria in mind (7 quotations, with a density of 4), and thus being energetically inefficient as a general rule. In most buildings there has been no consideration of consumption or concern for reducing it, and they have been designed as individual blocks, which duplicates services and thus leads to more consumption (*see figure 4.4.1*).

Another important structural barrier is the lack of a well-organized public transport system, which, together with the lack of a student residence make for high CO2 emissions resulting from mobility. Calcullations of the University´s environmental footprint have indicated almost 50 % of all university emissions come from mobility. Finally, another barrier, although not as important as the other ones, is the lack of adequate storing systems for some of the waste generated and of the human resources to manage it.

This family of codes paints a picture of infrastructure not being supportive for pro-environmental practices and behaviour, but rather posing significant obstacles for environmental policy targeting energy efficiency, for example. This justifies the stress placed by the University on energy as an area of improvement, and their insistence with the need for infrastructure adaptation. The architectural criteria dominating the design of University buildings were the ones dominating the profession before the advent of climate change concerns in building design. Given the fact that the University is a public institution and would not have the budgets for radical infrastructure improvements even in times of economic abundance, other avenues for environmental performance improvement need to be found. As identified previously, the replacement of energy systems with more efficient ones in certain buildings and the experimentation with geothermal energy to heat the swimming pool of the Faculty of Educational sciences have constituted important advances. However, it also seems obvious that given limited resources the University will have to be creative in its design of sustainability policy and capitalize more on the improvements that changes in human behaviour could bring.
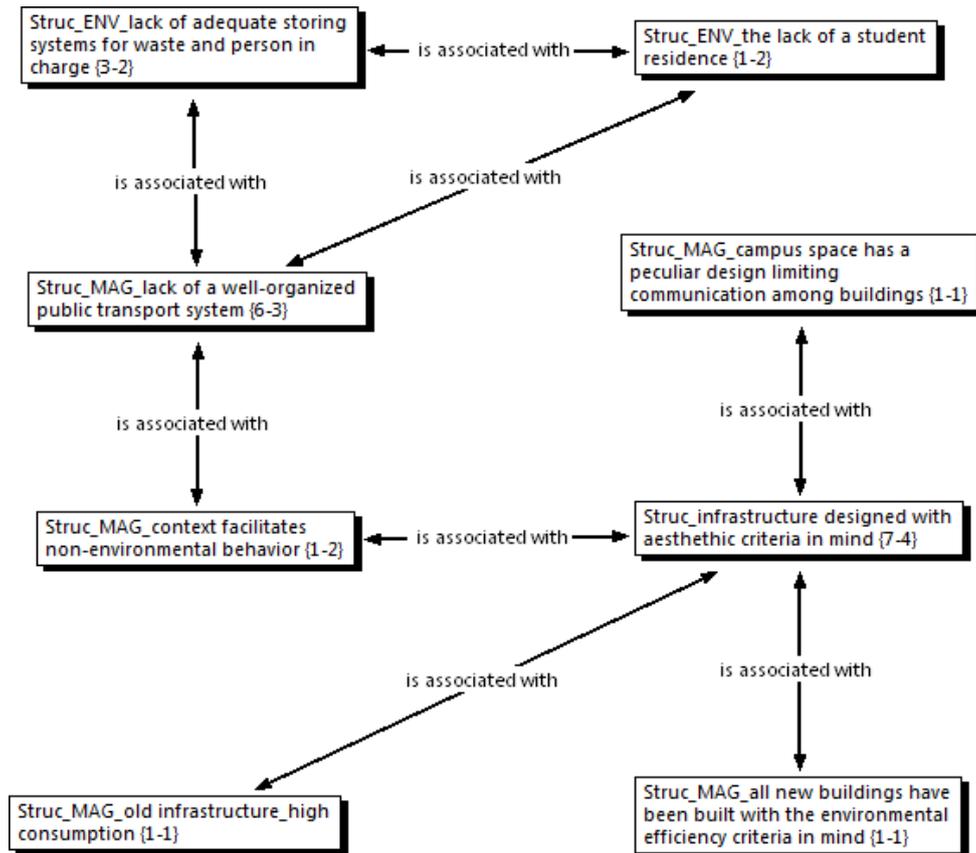
Figure 4.4.1. Structural factors affecting pro-environmental behaviour at the University

External cultural factors affecting everyday practices in the workplace

The University, as any organization, does not exist in a vacuum. The cultural context surrounding it, and brought in by workers and students through their systems of beliefs, values and attitudes, influences organizational policy and the extent to which managers themselves are sensitive and willing to perform more radical changes in terms of promoting pro-environmental behaviour at the University. Also, the way in which cultural factors are reflected in the discourse of organizational leaders is relevant, given that discourse organization reflects implicit beliefs about barriers, drivers and responsibility for action *(see figure 4.4.2)* When it comes to cultural factors influencing everyday practices at the

university, there is a widespread perception that the larger normative societal context does not promote environmental norms and behaviour in Spain. What is implied in this perception is, on the one hand, that people do not have the adequate beliefs, values and attitudes, and, on the other, that there is no external pressure on the university to actually implement policies that would restrict unsustainable behaviour or, more generally speaking, promote pro-environmental behaviour. Furthermore, as the University is a public organization, the cultural ethos of public administration is mentioned to endorse leadership styles that put no pressure for compliance to authority, which, combined with a lack of awareness of the "ownership" of public good, creates a situation where neither economic considerations nor hierarchical directives can become a driver for pro-environmental behaviour. Among cultural factors, there was also a mention to the fact that car ownership is positively seen among students, which constitutes a barrier to low-carbon mobility behaviours.
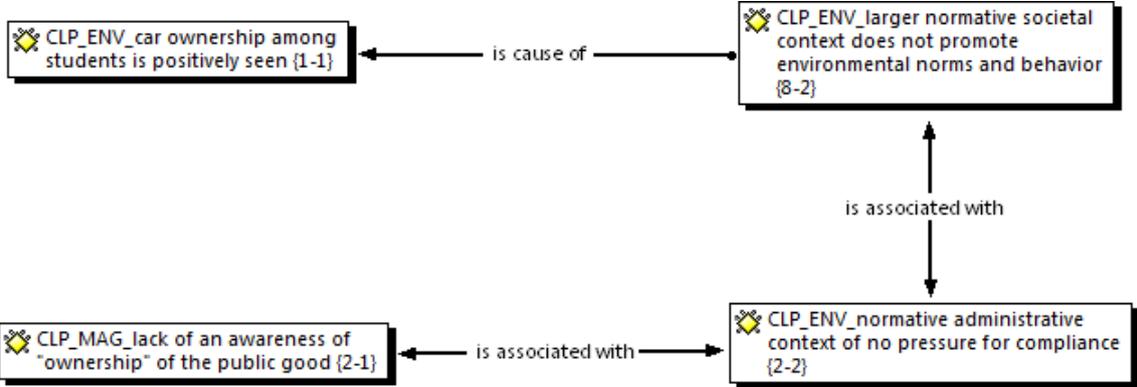
Figure 4.4.2. Factors pertaining to the wider cultural context influencing practices

Economic factors affecting everyday practices in the workplace

When referring to limitations for environmental policies at the University, the economic factors are among the most mentioned. A subjacent belief that environmental policies are costly and can only be undertaken when budgets are considerable can again be detected. Environmental policies are mostly associated with infrastructure adaptation and technological change, which generally require high initial investments. This is thus specified as a barrier in promoting environmentally-friendly practices in the workplace (*see figure 4.4.3*).

This contradicts the belief present at the university, at least among environmental management staff but also among administrative and economic management that awareness-raising campaigns are the most effective solutions for promoting pro-environmental behaviour. In line with this, all University managers mention the economic crisis Spain is going through as a barrier to promoting environmental policies, and mentions that this situation has stalled all pro-active policies, as budgets tend to only be granted for maintenance (again indicating an understanding of environmental policy as infrastructure renewal).
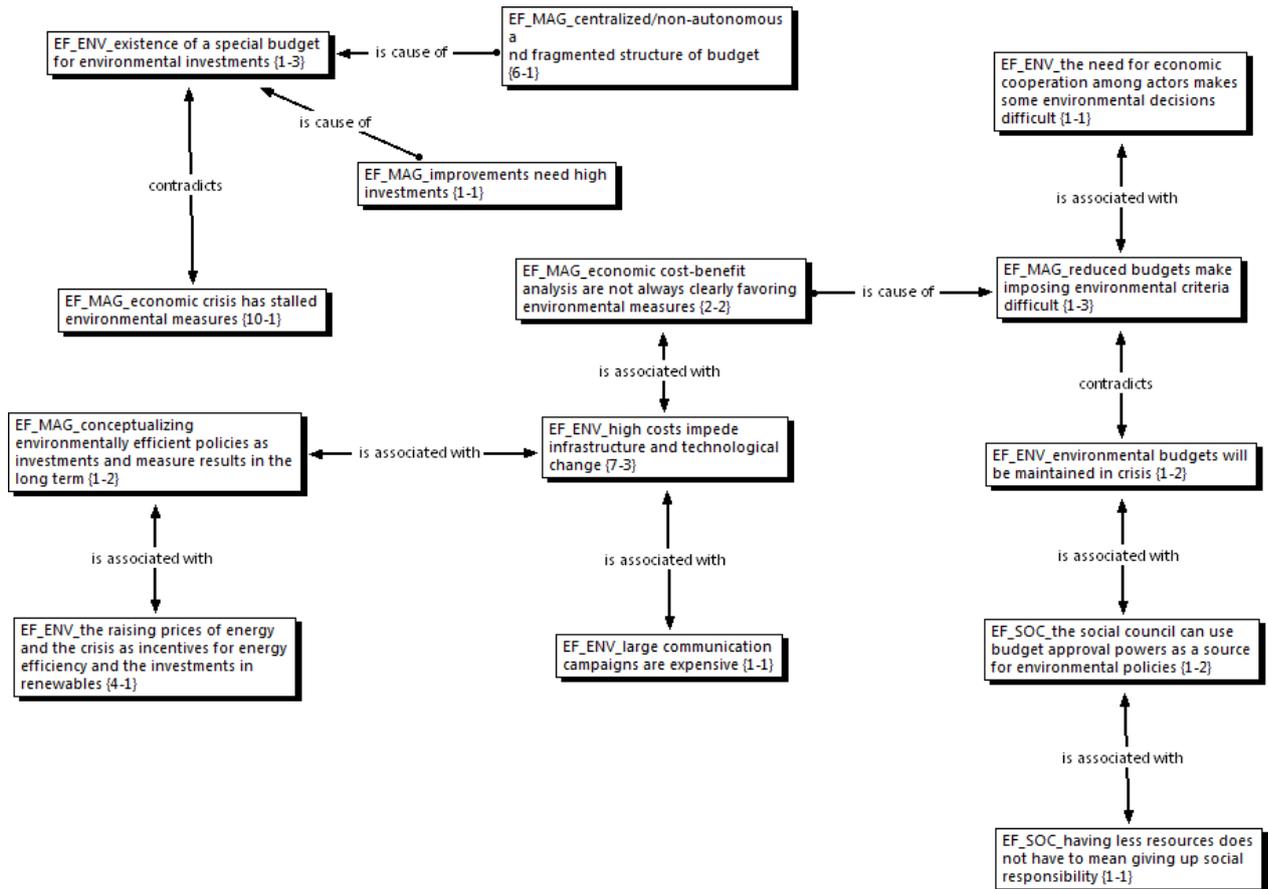
Figure 4.4.3. Economic factors influencing sustainable practices at the University

When referring to the times before the economic crisis, it is mentioned that the centralized and fragmented structure of the university´s budget has sometimes constituted a barrier to environmental policy and actions, as these need to be transversal and also take into account the different characteristics of buildings and campuses, which entails de-centralization of decision-making powers to intermediate level managers. Also notable is the fact that staff in charge of environmental issues sees the crisis and the previously raising prices of energy as incentives for energy efficiency and for investments in renewable energies, and this is not the

case with the centralized and administrative management, which tends to think about these issues in opposite terms: the economic aspects come first and environmental policies and actions come after. This is also supported by a perception that economic cost-benefit analyses do not favour environmental actions and policies, unless they are conceptualized as investment and measured in the long term.

The dichotomy between environmental and economic goals is thus visible in the discourse of University managers. Although it has been argued in the first chapter of this work that the ethos of private organizations seems to be changing towards an understanding of environmental impact as either a definite limit that needs to be considered in any long-term business planning, or as an intertwined set of objectives that challenges the traditional neo-classical view of economics of the prevalence of profit-making (Ones and Dilchert, 2012; Etzion, 2007), the University does not seem to follow this trend. Public organizations normally frame the discourse in a different way, with the most progressive ones arguing for their role as frontrunners of environmental policy and as hubs for creative innovations in both technology and policy for sustainable transitions. In the present case study, management views on this topic are based on the classical value-based defence of environmental objectives in spite of economic considerations that public organizations tend to endorse, and an overreliance on infrastructure and technological change as means for achieving a higher level of environmental performance.

Although management members bring the maintaining of the same budget for environmental policy as a proof of their environmental commitment in hard times, the reality is a national level legislative bill has mandated that budgets be maintained for universities to the level of

the previous year. It is only within the autonomy granted to universities to divide budget according to their policy plans that credit can be given for the maintenance of environmental budgets.

Political factors affecting everyday practices in the workplace

When it comes to political factors influencing everyday practices in the workplace, the relative lack of competencies of the university over space use, public transport and waste management are considered important barriers in promoting environmental policies and practices among workers (*see figure 4.4.4*). A recent conflict between the university and the local government over space use, which resulted in the resignation of the Vice-Rector for Infrastructure and the Environment has made this more patent and present in the discourse of university management staff.

In the case of public transport, the competency resides within the local government, which has been responsive to demands of the university for buses connecting the city with one of the main campuses, but not with surrounding towns, and which has been willing to help establish a train stop on campus, although this has not proven effective, due to an overutilization of private cars for accessing campus facilities, an overall lack of effective multi-modal connections for transport in the region and a face-value understanding of the multi-level interventions required to promote mobility behaviour change.

Waste management is undertaken by the local government with no cost for the university, so the university does not have decision-making power over this area, but can only act on the side of waste generation, by implementing policies to reduce it. This is connected with a

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perception that there is a lack of collaboration between the university and public bodies in environmental issues, although this opinion is not shared by the administrative management of the university. Only the area of management of toxic waste is signalled as a success by management.

Another important reference is made to the democratic election system of the university as both a driver and a barrier to environmental action and policies. It is considered a driver due to the fact that it stimulates good practices and adequate responses to worker demands, but it is also a barrier because it sometimes means that policy does not have adequate continuity and, most importantly, that there is a tendency not to undertake expensive systemic changes, because their results are often only seen and can be considered profitable if measured over an extended period of time. It is interesting to note the contradiction between these perceptions regarding the continuity of policy and participation processes being reflected as guarantees for the continuity and correction of policy in the organizational documents analyzed before.
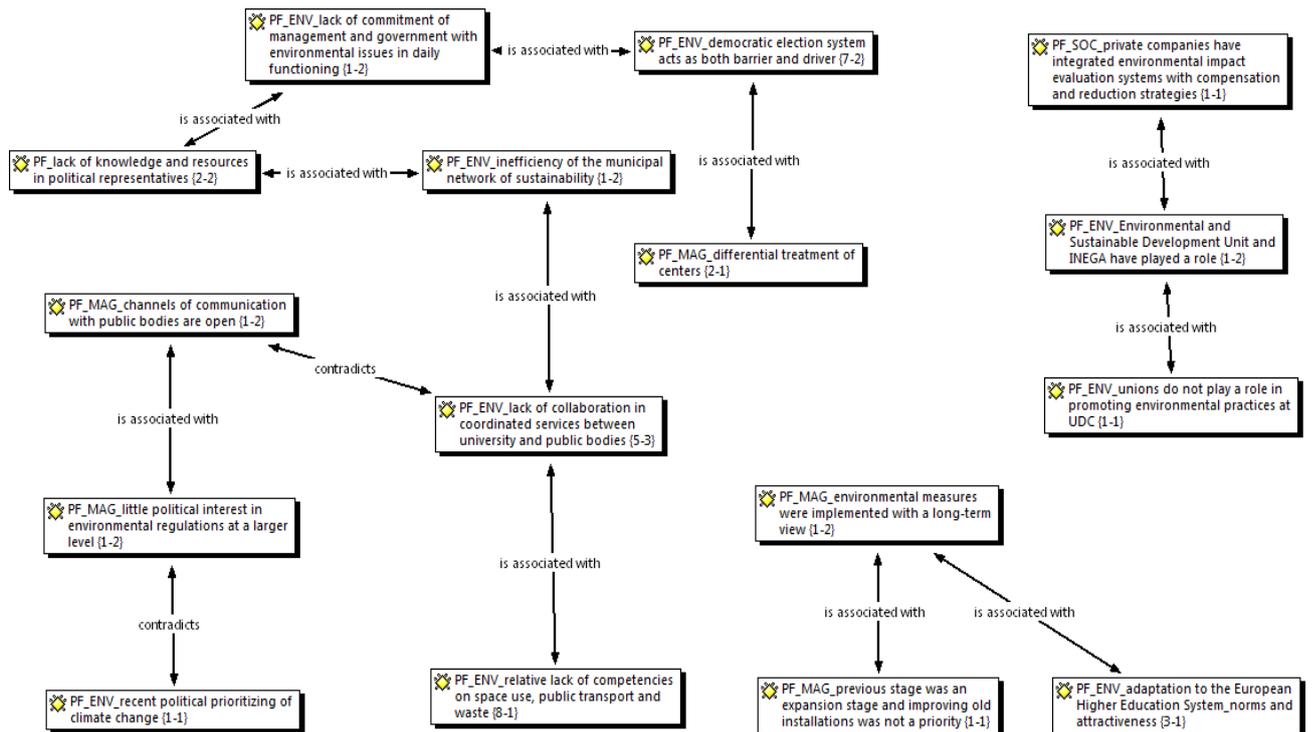
Figure 4.4.4. Political factors affecting pro-environmental practices at the University

Several external actors are mentioned as either relevant or not for the environmental policy of the university. Among the positive influences, the Energetic Institute of Galicia, a government organization in charge of defining energy policy is mentioned, as well as the growing awareness and integration by private companies of environmental impact assessment systems, which creates a context in which desirability of good environmental performance becomes unquestionable. Unions are mentioned as actors that do not play a relevant role in promoting environmental policy at the university, which is in contrast with results obtained in the case of two private transnational corporations studied within the European project LOCAW, in which unions do play a relevant role in promoting environmental practices, although their role is

only recently starting to be assessed in relation to conversion processes to green organizations (Uzzell and Räthzel, 2013).

It is also interesting to observe that staff in environmental leadership positions sees the recent prioritizing of climate change at a political level as a driver for university environmental policy, while administrative management staff considers that there is little political interest in environmental regulations at a larger level. This could be due to a double political message which, on the one hand, appears to put value on environmental objectives and has agreed to ambitious targets of emissions reductions stipulated in international agreements while, on the other, does little in terms of more radical systemic change or is contradictory in its policy proposals (e.g. providing significant support for the acquisition of private cars, through government subsidies).

When asked about improvements of old installations before the economic crisis, one justification offered was that the previous stage was an expansion stage and improving old installations was not a priority, but rather attention was given to new infrastructure. The new infrastructure has included environmental criteria into the design, yet they still pose important efficiency problems, which might also indicate that the University might endorse sustainability at a rather superficial level.

Social factors affecting everyday practices in the workplace
The central and most charged code of this category refers to a perception of low bottom-up pressure and demand for environmental policy and practices to be implemented and/or supported at the University (*see figure 4.4.5*). This is somewhat in contradiction with the

perception of interviewees that there is a general social sensibility with the issues of sustainability and climate change, at least posing the question of the reason behind this sensibility not being translated into bottom-up demand or initiatives to promote pro-environmental practices at the University. However, the economic crisis is brought again into discussion as an interpretation for this lack of bottom-up demand. Thus, environmental policy is perceived to be stemming from the assumption of a social responsibility agenda on the part of public institutions. Interviewees also perceive that if environmental policy affects comfort and commodity, then it will be politically punished.
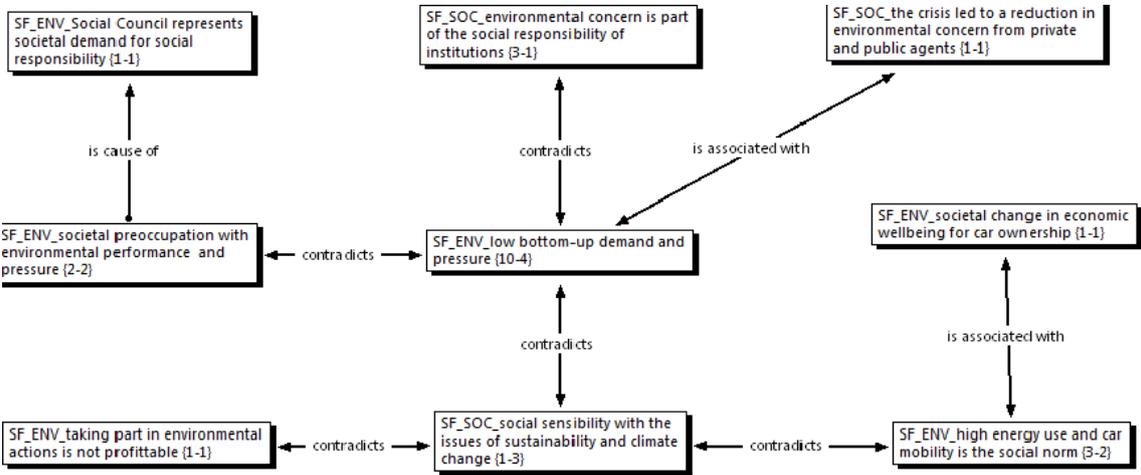
Figure 4.4.5. Social factors influencing environmental practices at the University

Not having any environmental demand in a democratic election system of management as the university has, makes environmental policy almost entirely dependent on the good will of managers, budgets and political pressure from other state organizations. Even when there has been demand for more environmentally friendly policies at the university, they have tended to

be isolated and corresponding to a minority (for example, one request has been made for ecological and fair trade products in the university's cafeterias).

In spite of the fact that there is a higher perceived social sensibility with the issues of sustainability and climate change, car use behaviours, high energy use and the perception that taking part in environmental actions is not profitable is still the norm. However, societal concern with environmental performance is translated by the Social Council into a demand for a sound social responsibility strategy. Its representative perceived environmental performance as being part of the social responsibility of institutions, although it does recognize that the economic crisis has led to a reduction of environmental concern from both public and private actors.

This result is thus very significant. In interviews with managers, I noted that whenever they are asked specific questions about environmental policy, they tend to name the director of the environment office and send us to talk to him. The naming of a coordinator for the Environment Office, although positive for the promotion of environmental policy, has also contributed to the concentration of responsibility in one person, which leads to a lower perceived level of responsibility for other members of staff, including members of the management team. Given the low perceived level of bottom-up demand for sustainability-oriented measures, it seems clear that unless the cycle of low bottom-up pressure and management placing responsibility on the Environment office alone is broken, and the university community assumes joint responsibility for environmental outcomes, environmental policy is likely to consist of token measures only.

Technological factors affecting everyday practices in the workplace

Relatively few technological factors are mentioned, that are considered to have an influence over practices in the three areas of study (*see figure 4.4.6*). Among them, the existence of energy efficient systems on the market is mentioned as a driver, while recognizing, at the same time, that the adaptation of energy systems in the university is necessary and still pending. Even in one of the areas of which the university is most proud of, which is the reduction it has achieved in paper use, it is still considered that further reductions can be aimed at by utilizing technology such as the introduction of the electronic signature. The impossibility of the reuse of electronic waste is mentioned as a barrier, given that the university is a high user of computers.
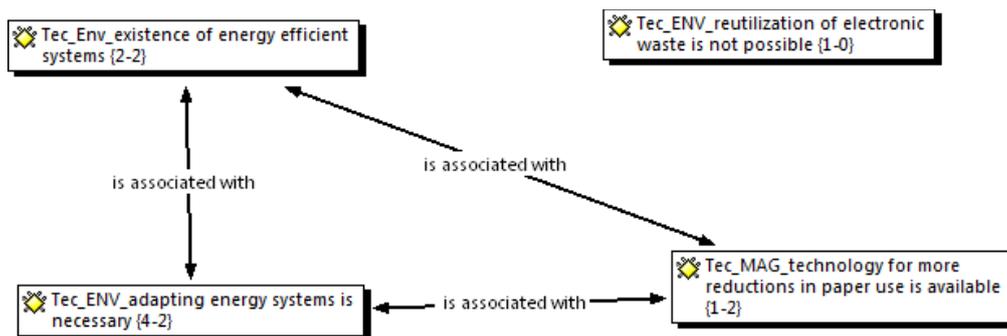
Figure 4.4.6. Technological factors mentioned as drivers or barriers of environmental practices

It is worth noting that only very few technological factors considered to play a role in the promotion of pro-environmental practices at work. This is a rather strange result given the importance technology is accorded in sustainability innovation studies and the possibilities of, for example, targetting an important number of workers in awareness-raising campaigns or in

any behaviour changing policies. It might indicate a lack of awareness regarding the possibilities of technological use in changing pro-environmental behaviour at the University.

Elements of organizational culture affecting everyday practices in the workplace

Organizational culture can potentially play an important role in promoting pro-environmental behaviour in the workplace (Norton et al., 2015). Organizational cultural elements appearing in the discourse of interviewees refer to preferences around hierarchical relationships, and it is mentioned that the University has no functional hierarchies as it is conceived as a society of equals, which has a consequence the fact that even monitoring systems that might be necessary for the provision of tailored feedback and the measurement of policy performance might be perceived as punitive (see *figure 4.4.7*). However, a previous study has shown that workers are concerned about monitoring only when they worry about the consequences of such monitoring, which can be diminished if positive behavioural incentives are provided (Bolderdijk *et al.*, 2012). Two other cultural elements are mentioned as important for pro-environmental practices: on the one hand, organizational culture supports centralized financial decision-making, in order to avoid the possibility of corruption accusations. This goes against the necessary decentralization for decisions to be made at the level at which most knowledge exists about appropriate interventions (e.g. vice-deans). On the other hand, the model provided by the behaviour of management is mentioned as a negative influence, as they are not perceived to adequately display pro-environmental behaviour.
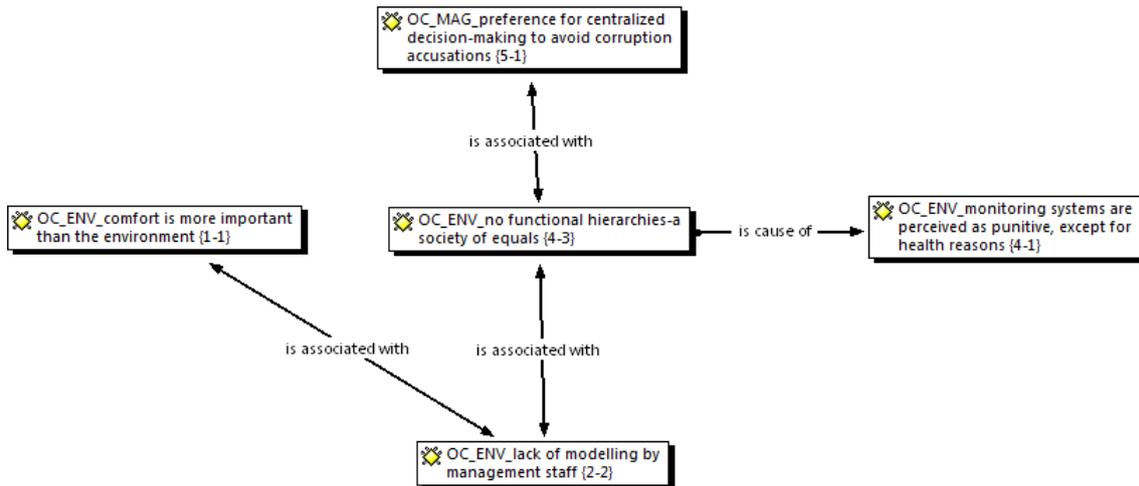
Figure 4.4.7 Organizational culture elements influencing pro-environmental practices

Values present in the discourse of leaders

The value declarations of the people interviewed can be grouped around two fundamental themes (see *figure 4.4.8*). On the one hand, the university is seen as an organization that represents a societal model and a public institution which needs to assume certain value-laden objectives regardless of other (mostly economic) considerations. There is also a subjacent belief that environmental measures and criteria are not compatible with economic criteria and thus need to be assumed based on value-beliefs. The consequence of this thinking is that, when funds are limited, environmentally-relevant decisions are postponed or are limited, especially when requiring higher initial investments. These assumptions seem to be shared by most managers at the University. A notable exception to this trend is the Social Council, who maintains a position that stresses the necessity to make environmental thinking compatible with economic criteria, and integrate environmental action into processes of economic decision-making of the university leadership.
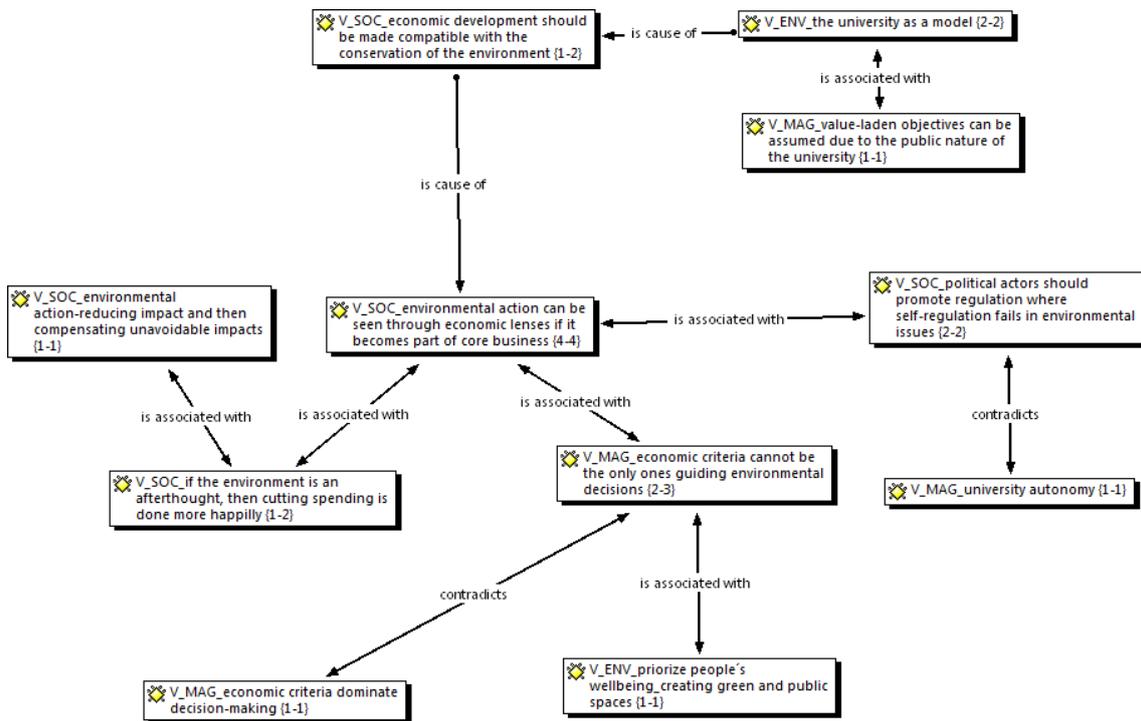
Figure 4.4.8 Values in the discourse of University management staff

Beliefs regarding environmentally relevant organizational practices

During the interviews, references were made that fit the category of beliefs regarding factors that would promote environmental practices and behaviours. The dominant beliefs are that environmental behaviour is promoted by awareness-raising campaigns combined with real behaviour alternatives and that workers need a context that supports environmental decisions and thus limits individual choice (*see figure 4.4.9*).

Nevertheless, and in contradiction with the latter, there is also a belief that technological devices for energy saving are not the solution and also that people that already have environmentally-friendly habits do not need any services provided by the university (for

example, when it comes to providing bicycles for internal mobility). There is an assumption that spillover is a consequence of appropriate habits outside of work and thus a perspective that context is less important in guiding decisions.
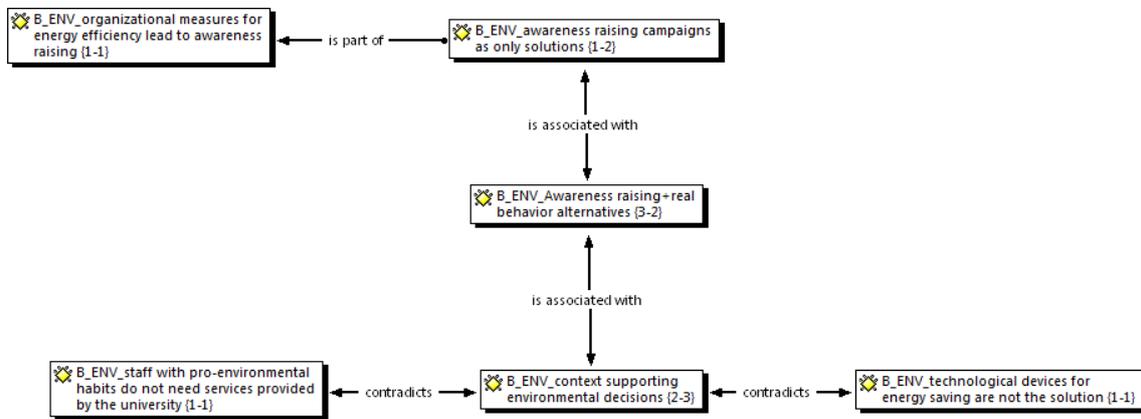
Figure 4.4.9 Beliefs regarding causes of pro-environmental behaviour change

This is supported by a belief that awareness-raising campaigns are the most important interventions for behaviour change, which is in line with policies already undertaken at a larger societal level. This is a problematic tendency, considering that these ideas are pervasive both among the management staff of the university and among personnel in charge of environmental decision-making and interventions. This information-deficit view of pro-environmental behaviour has long been discarded in the field of environmental psychology, as it is now generally acknowledged that pro-environmental behaviour is not a direct consequence of appropriate or complete knowledge. While knowledge is still recognized as important, it is as an indirect predictor of behavioural intentions, influencing other attitudinal and normative predictors of behaviour (Bamberg and Moser, 2007). Finally, there is a belief that pro-environmental measures generate awareness by themselves, but it is rather clear that

in order for this to happen, there is a need for adequate communication of measures and the objectives guiding them to university members. It is interesting to note that social influence processes are not mentioned in the interviews.

Motivations of managers to promote pro-environmental policy

Among the main motivating factors for environmental policies and actions at the university, interviewees mention the participation in CRUE as one of the main causes of implemented measures. The context for comparison with other Universities which the CRUE provides acts as a driver. Also, personal values and sensibility of managers were considered important motivators. One of the most populated codes refers to economic costs being an important motivator of pro-environmental policy, which is seen as an effective way to reduce them. It seems clear that this refers to energy policy (see *figure 4.4.10*).
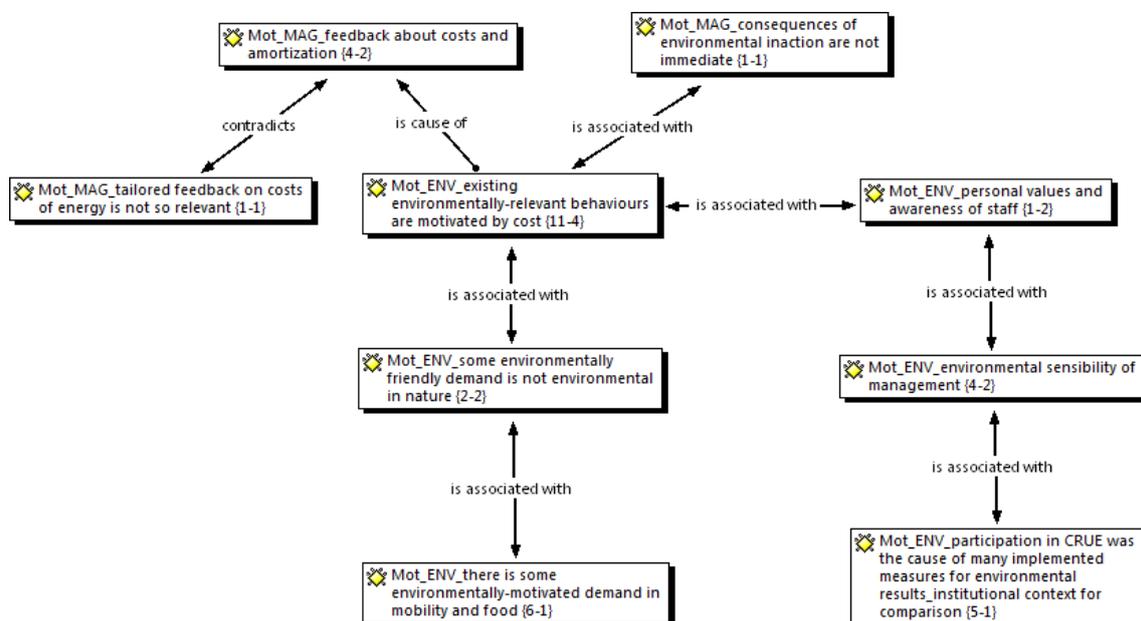
Figure 4.4.10 Motivation to promote pro-environmental policy

Regulatory framework of environmental practices

There are several interesting trends that can be spotted, when analyzing this family (see figure 4.4.11). On the one hand, the legislative framework for energy efficiency in buildings and waste management certification are perceived as adequate and as a driver for environmental practices at the university. The CADEP is a national-level commission in charge of defining sustainability criteria for universities, in line with the national legislative framework and with other objectives that the Spanish Conference of Rectors defines (CRUE). In the university under study, the criteria are applied in new buildings in construction, lighting systems and the use of alternative energy sources.

In the same direction, the most important influence in establishing and applying environmental criteria in university energy, mobility and waste management decisions comes from the Conference of Rectors, which is perceived as a driver and as a positive influence. Nevertheless, the criteria defined by CRUE are non-binding, which leads to a situation where there is a lack of standardized procedures to guide decisions that have an impact on university emissions. In these conditions, it is very complicated to establish routine practices and decision-making habits which would transform the university in a low-carbon organization. Finally, the European technical criteria for grading buildings are considered a driver, although it is recognized that they have not been implemented in Spain so far.
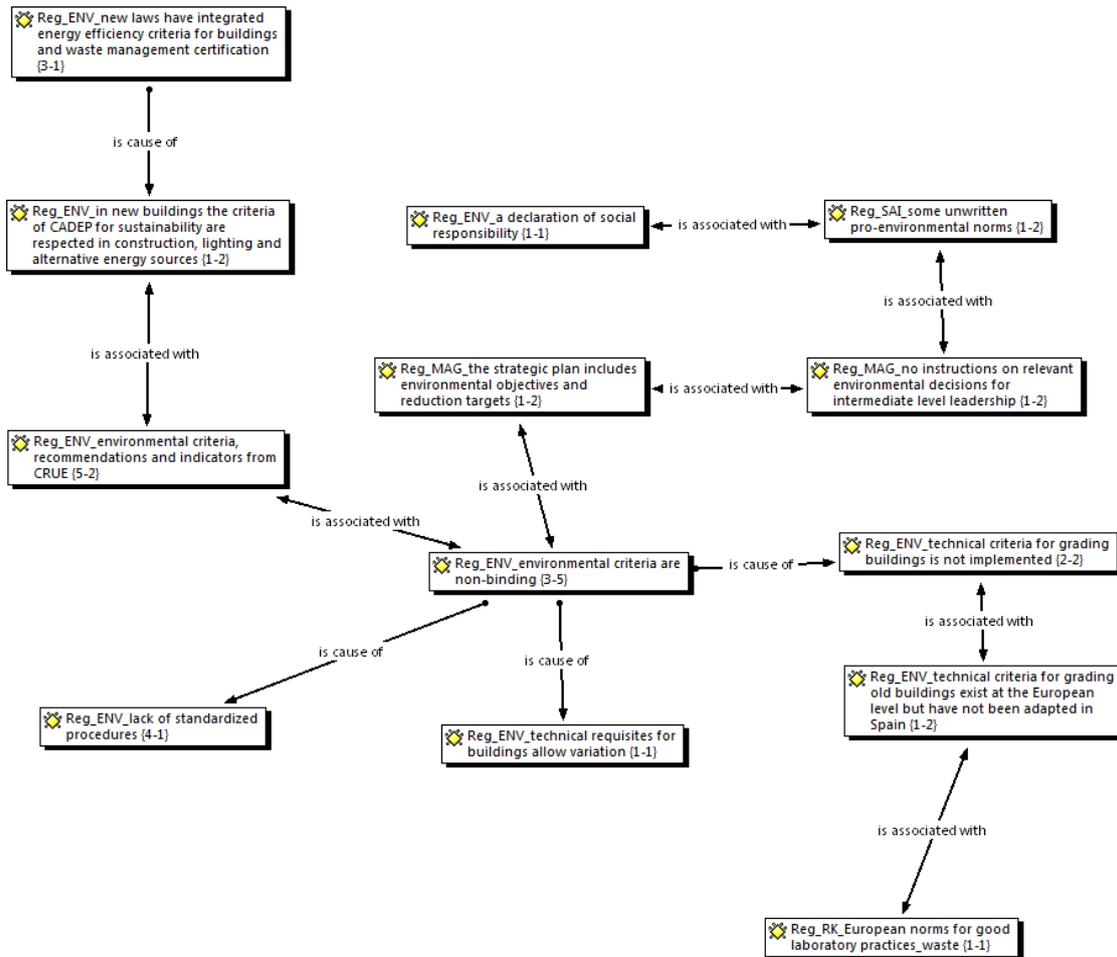
Figure 4.4.11 Regulatory framework of pro-environmental practices

Human resources and role assignment

Several factors belonging to the organization are seen as barriers. Interviewees signal an important lack of human resources in environmental management and action (the code is one of the most populated ones, with 7 quotations), which limits the things that can be done to transform the university in a sustainable direction. The Office of the Environment has a Director, but has no staff of its own, and can only rely on the work of students on scholarships, which limits its possibilities of action *(see figure 4.4.12).*

Another important code refers to the deficiencies in task assignment and role descriptions which hinder efficient policy-making. This code is related to the previous one and refers to the fact that environmental decisions and policies do not correspond to specific staff roles. This has as a result a situation in which deputy deans end up taking care of maintenance and spending their time in tasks that could perfectly be performed by specialized maintenance personnel.

Finally, another important code refers to the need for coordination and integration of systems. There is a perception that policy-making is undertaken in separate departments which are insulated and thus information and action do not flow in a coordinated way to ensure transversal application of environmental criteria in all university actions.
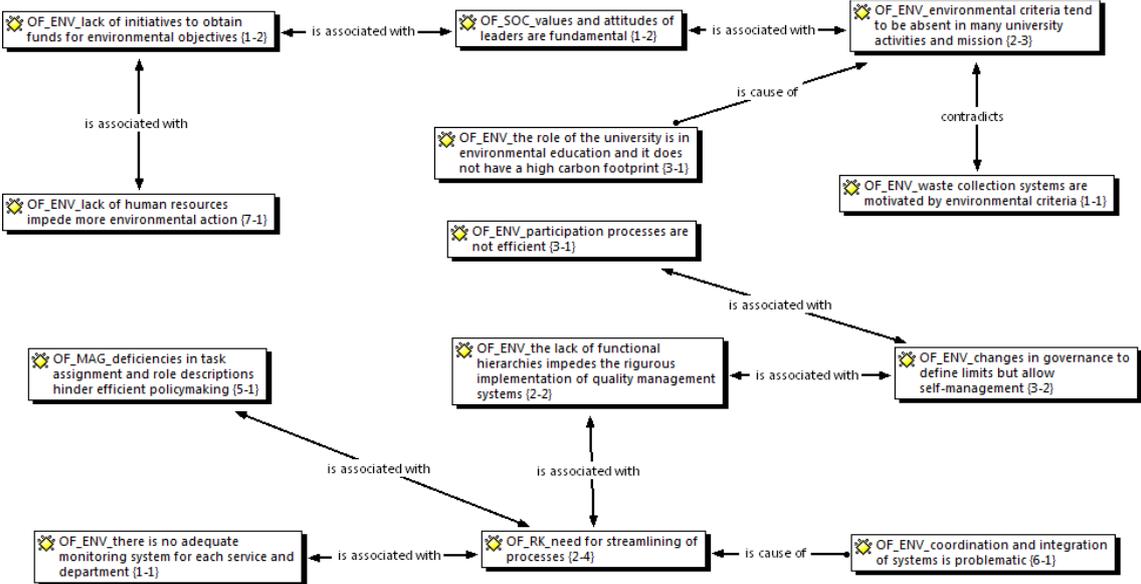
Figure 4.4.12 Distribution of resources and organization of tasks influencing pro-environmental practices at the University

Communication processes influencing everyday practices in the organization

The fact that environmental information is not communicated through adequate channels constitutes an important barrier. Information is centralized by the Office of the Environment and it is many times communicated in reports, presentations at specific events and the webpage of the Office. As can be seen in *figure 4.4.13*, managers at different levels of decision-making perceive that this information does not reach them in an adequate way, or it is not followed by tailored recommendations. However, managers have decision-making power to change this situation. The fact that they mention this as a barrier might indicate either that they are aware that resources assigned to the Office for the Environment are not sufficient, or it is a useful way of shifting responsibility. Middle-level managers have the same perception, and, differently from the same category, they do not have decision-making power over this situation, although they could demand better ways of policy and information dissemination that could help them in decision-making situations.

Together with the lack of human resources mentioned above, this leads to a situation in which decisions are not made with environmental criteria in mind. Related to this, it is mentioned that feedback about energy use, even when it is produced, it is slow and does not reach staff in a usable way for both environmental policy and practices to be integrated into daily working life.

As a consequence, several interviewees have suggested the need for the promotion of meetings among intermediate level managers to discuss issues of common interest, learn about good practices from their colleagues, and find common and creative solutions to

experienced environmental dilemmas. No meetings of this kind have been promoted by the corresponding Vice-Rectorate.
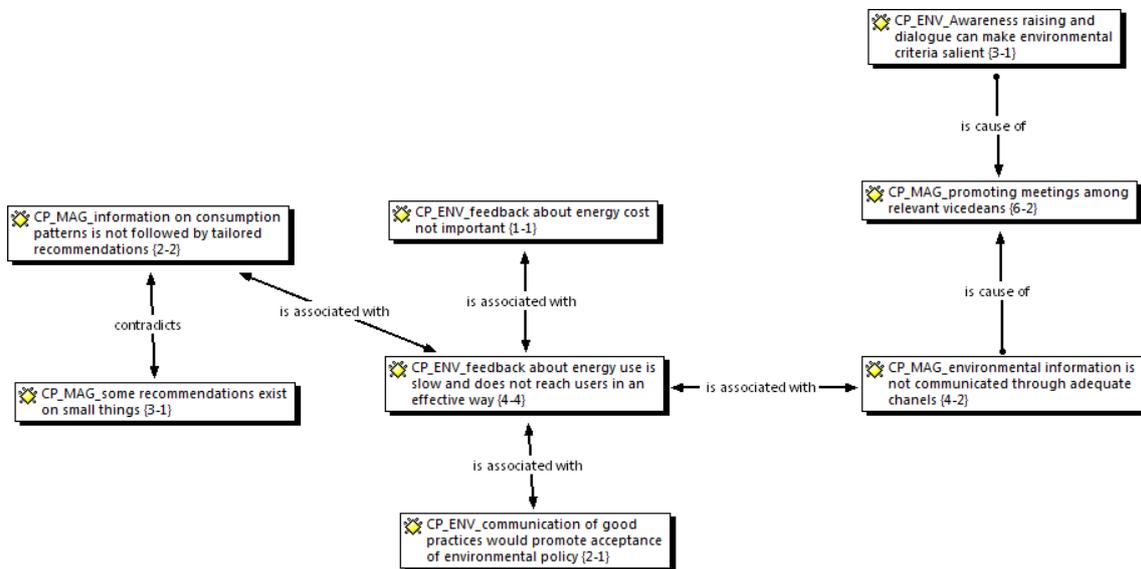
Figure 4.4.13 Communication processes influencing pro-environmental practices

Environmental performance evaluation strategies

Measuring environmental performance at the university also poses several problems. The most important one refers to the lack of measurements over time, in the three areas of practice studied. This means that the evaluation of policies in terms of emissions reduction is practically impossible. Nevertheless, these measurement systems have started to be implemented in the last few years and are still being developed. For example, one of the codes refers to the system of indicators regarding CO_2 levels that the risk prevention unit is creating for certain research laboratories, and another refers to the measurement and control of energy consumption in buildings being performed by the Maintenance Unit and the Office of the

Environment for every building, which has allowed for the calculation of the ecological footprint of the university (*see figure 4.4.14*).

As a barrier, it is also mentioned that some existing indicators for measuring environmental performance in universities are not implemented and also that management should have adequate and periodic monitoring systems in order to ensure that environmental performance reaches the standards established by the university in its strategic plans.
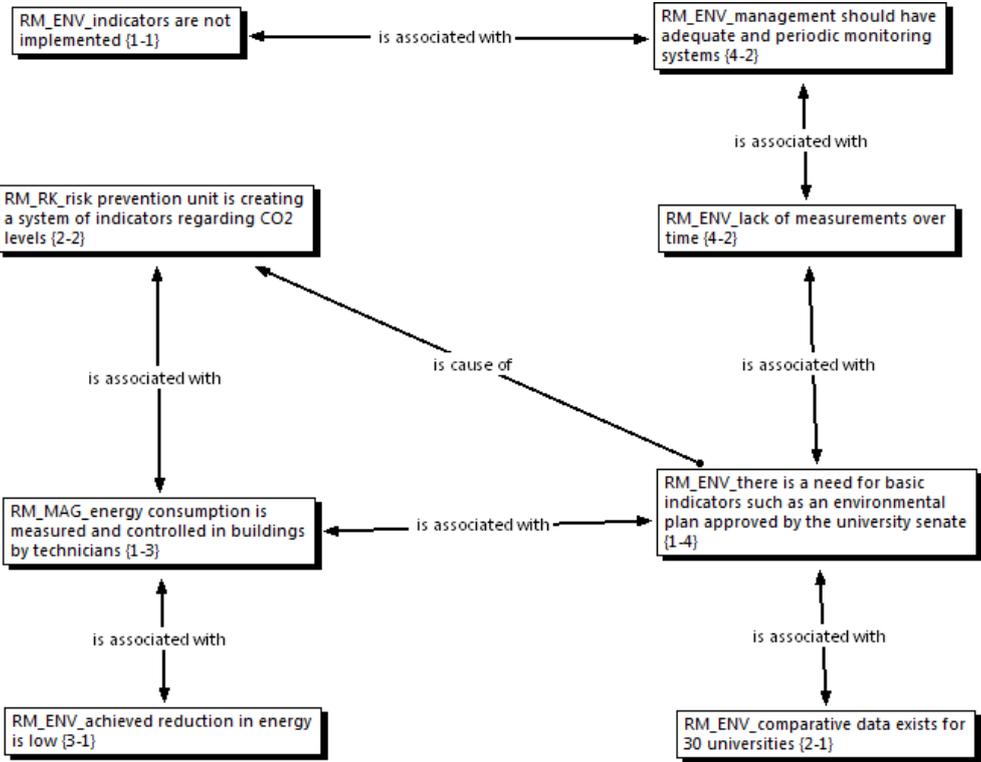
Figure 4.4.14 Performance evaluation strategies in the organization

Positive and negative practices in the organization

Among the good practices mentioned, the following can be found: changes in sources of energy towards cleaner energy, energy efficiency measures and implementation of a system of measurement in every building, the processing of radioactive waste, periodic collection and storage of electronic waste and some advances in green contracting (*see figure 4.4.15*). Nevertheless, interviewees also mention that diesel is still dominant, that waste management practices are deficient when low cost and externalized, and that there are significant limitations to the efficiency of sustainable transport and that spillover of good behaviour from home to work does not seem to occur. Thus, although interviewees are aware of some of the good practices undertook by the University (although not of all, or even the most important ones, as some of the investments in renewable energy sources are not known), they are also able to identify a lot of the existing limitations.
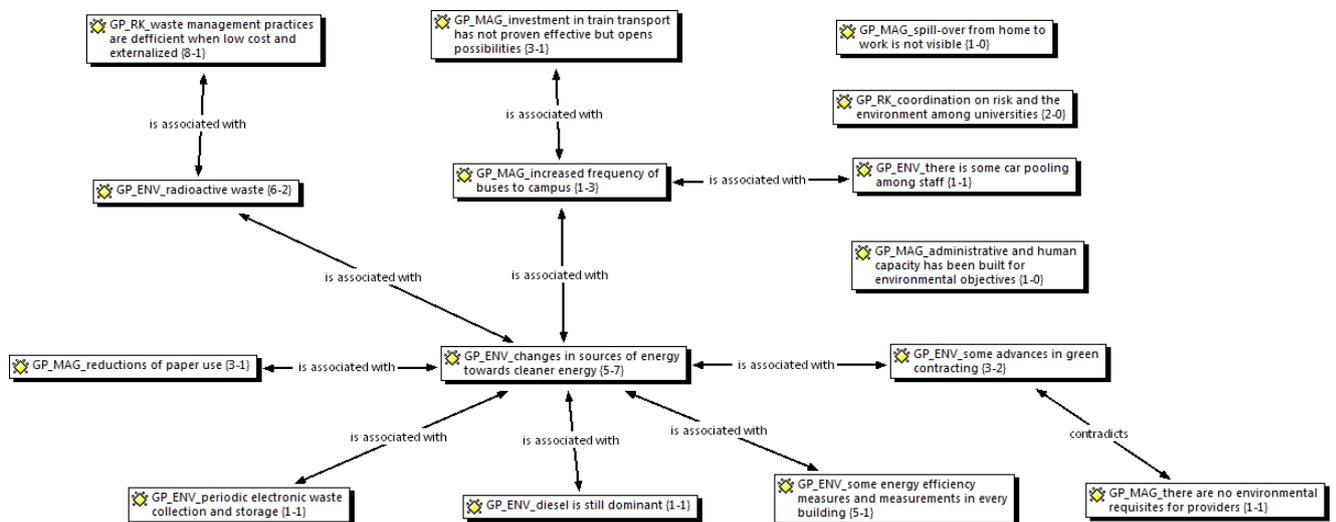
Figure 4.4.15 Positive and negative practices in the organization

Policy proposals in the three environmentally relevant areas

Policy proposals mentioned by the interviewees include the limiting of private car use and the improvement of public transport. It is not surprising that this is the most important code, considering mobility is responsible for a high percentage of emissions (*see figure 4.4.16*). They also include mentions to green contracting, infrastructure adaptation and the need to incorporate environmental criteria in new installations and buildings, among others. Policy proposals are an interesting category because it shows those areas on which management focuses and considers a priority, and in which they might be willing to intervene. However, it has also become obvious from analyses in Study 1 and the analyses of the interviews that willingness to carry out more radical environmental policy is significantly limited by a series of structural, organizational and also individual factors, the latter having to do with the management´s beliefs regarding environmental policy.
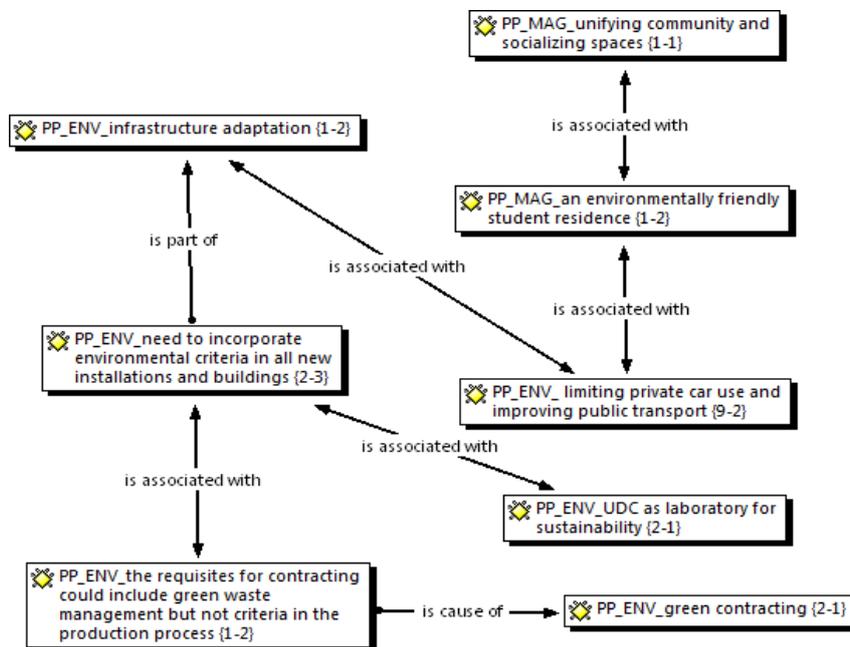
Figure 4.4.16. Policy proposals

Learning opportunities on environmental issues in the organization

Regarding learning opportunities on environmental issues, it seems most are available to students through the curricula, through specialized courses and volunteering actions (*see figure 4.4.17*). These opportunities are rather limited for staff and they refer to awareness-raising campaigns and the actual changes in policy. The latter can only be a learning opportunity if changes are visible or are well-communicated by the Office of the Environment. The existence (or lack thereof) of learning opportunities for pro-environmental behaviour can point to organizational practical commitment to the promotion of pro-environmental behaviour of workers and students. Even for students, these are limited to courses and volunteering actions, with the first only transmitting knowledge of environmental issues (which is a necessary but insufficient condition for pro-environmental behaviour), and the second normally reaching those that are already sensitive to and motivated by environmental issues.
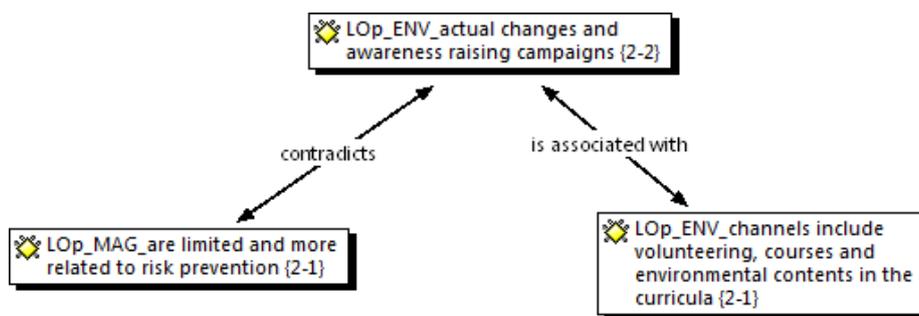
Figure 4.4.17. Opportunities for learning pro-environmental behaviour at the University

4.4 Discussion

Nine in-depth interviews were carried out with members in key management positions, ranging from academic, to administrative and environmental ones. The University´s connections with the external stakeholder environment through the Social Council were also considered relevant for this in-depth investigation of structural and organizational factors affecting the implementation of environmental policy and the behaviour of employees. Potential synergy areas such as health and safety were also considered, with the aim of reaching a comprehensive understanding of how the organization reacts to its external context, how it translates pressures into organizational norms and procedures, and what are the main variables influencing its position and progress on sustainability issues. As mentioned before, sustainability has become a key preoccupation for organizations and it has been suggested organizations prescribe as much as one third of pro-environmental behaviour taking place at work (Ones and Dilchert, 2012).

In-depth exploration of barriers to and drivers of pro-environmental behaviour in the workplace has been encouraged by Lo et al. (2013) in their recent studies on this topic, as there is a considerable lack of knowledge on what determines this type of behaviour in organizations and existing conceptualizations and empirical studies tend to be fragmented and use a variety of theoretical frameworks, methodologies and types of case study organizations. More qualitative studies have thus been deemed important, and a thorough inquiry through the use of life-history interviews within the LOCAW project has proven this point by

providing interesting insights into the conditions supporting or hindering the transference of practices between life domains, among other things (Uzzell et al., 2012).

Grounded theory was used to analyze the data, which is an approach that revolves around the progressive identification and integration of categories of meaning, and which refers both to the method by which categories are established ad the end product of a formulated coherent explanation of the observed phenomena. The constructionist understanding of grounded theory was used which accepts the impossibility of the neutrality of the researcher when placed in front of the data. Data analysis involved a constant comparative analysis and switching back and forth between theoretical frameworks informing this research (although relatively wide literature review was performed and did not adopt one comprehensive framework over others) and the data. As mentioned before, grounded theory approaches can entail either a process of moving back and forth between data analysis and collection of the data, allowing the researcher to go back and collect more data until reaching a point of theoretical saturation, or an approach in which the same data is used, as it is all collected before it is analyzed. This is a valid approach in the studying of contextualized and complex social processes (Willig, 2008; Curry *et al.,* 2009).

Findings of this study reveal a complex and fragmented picture of structural and organizational factors that might play a role in pro-environmental behaviour in the workplace. This picture could be summarized as being characterized by an impressive number of perceived barriers to environmental performance while leaving a similarly impressive number of opportunities for sustainable organizational change unrecognized and untapped or latent. Factors that belong to both the external and the internal environment of the organization

interact in ways that explain both the relative level of inertia encountered as well as the latent possibilities that could be used to further adopt and implement policy, encourage workers to act pro-environmentally and become a place where students can develop strong pro-environmental values, beliefs, competencies and habits.

There have been several conceptualizations of structural and organizational factors influencing pro-environmental behaviour in organizations. When looking at factors determining the environmental performance of firms, Etzion (2007) has listed external factors such as regulations, demands of consumers or other relevant stakeholders and the self-regulation processes of the industry or domain of the organization, and internal organizational factors such as its strategic and contingency attributes. Lulfs and Hahn (2013) have grouped organizational factors in organizational culture and structure, implementation of environmental management systems, the introduction of organizational codes of conduct and guidelines and the development of human resource programs to improve employees´ environmental competencies.

Organizations are embedded in a cultural, social and economic environment that has an influence on many organizational aspects. It has been argued that the external environment places a series of institutional pressures on organizations, which can be regulatory, normative and socio-cultural, and that organizational culture is a response to these pressures in ways that have proven minimally adaptive over time (Norton *et al.*, 2015). Results show that these types of pressures do influence environmental policy and its degree of implementation at the University. Regulatory pressures include European and National legislation that has been translated into recommendations by the CRUE, which is an organism aiming at providing

guidance to Universities on a series of topics of common interest, which include preoccupation with environmental performance. Normative pressures take the form of similar institutions, and public organizations in general, taking on sustainability objectives as part of their social responsibility agenda, which is evident in the perception of the CRUE creating a context for comparison and the mention of the European Higher Education space as constituting drivers for pro-environmental practices. Socio-cultural pressures are a bit more contradictory, as results show: on the one hand, interviewees perceive a general societal sensibility with environmental issues; on the other hand, this perception coexists with another, namely that the general social environment does not support sustainability, nor does the political agenda which is perceived to only endorse sustainability superficially. The perception of an extended culture of car use, for example, and the policy contradictions around mobility policy are mentioned as concrete examples of socio-cultural pressures acting against assuming an environmental agenda as part of the core functioning of the organization, and rather favouring just enough measures to justify what could be considered greenwashing.

In spite of environmental objectives being considered normative and value-laden aims the University should pursue, it is also apparent that the economic crisis has brought economic concerns at the forefront. While this could have been expected given the timing of the research, the interesting findings have to do with how economic considerations are used in the discourses of interviewees and what they reveal about their views and assumptions on environmental policy in the organization. First, it is visible that for most interviewees, environmental policy is associated with infrastructure change, which requires high initial investments, and the consequence of this view is that in times of economic constraints

environmental objectives get pushed down the list of priorities. Secondly, and as a consequence of the first point, there is a belief that environmental objectives tend to be at odds with economic cost-benefit analyses and should be assumed based on normative considerations. However, the logical consequence of this type of thinking is that value-laden objectives are a luxury when budgets are limited, thus strengthening the tendency to consider them secondary to economic efficiency calculations. Third, there seems to be an underestimation of the impact of behaviour change measures that do not require infrastructure change, and when they are acknowledged, as in the case of mobility, responsibility is either shifted to cooperation with external actors or policy is seen as potentially costly in political terms. Furthermore, although the University has a democratic government system and established internal structures of participation, this does not contribute to the articulation of bottom-up demand for sustainability measures, or this demand does not reach management in an effective way. The perception of interviewees tends to be that it is the sensibility of managers which has contributed to the creation of the Office for the Environment and to the policy agenda, but there is a lack of incentives coming from additional demands to pursue more radical changes in terms of both supportive infrastructure, and policy to promote pro-environmental behaviour among employees. An important policy track in the future should focus on changing the way environmental objectives are seen.

These deep assumptions around the relationship between economic and environmental objectives form part of the organizational culture, as Schein has argued (2010). Changing organizational culture towards an environmental one, would include a change in underlying beliefs about the interdependence of economic and environmental goals (Linnenluecke and

Griffiths, 2010). Norton et al. (2015) provide a useful definition of a pro-environmental organizational culture: *"a pattern of shared basic assumptions learned by a group as it adapts to the challenges posed by human activity´s impact on the natural environment in a way that permits day to day functioning, which has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way to perceive, think and feel in relation to environmental sustainability"* (p.329). Furthermore, as mentioned in section 1.2.3 of the literature review, the competing values framework is a useful way of understanding organizational culture and its relationship to environmental policy framing (Linnenluecke and Griffitts, 2010). Norton et al (2015) further argue that elements of more than one type of culture can characterize different levels, groups or areas of activity within an organization. According to this model, organizational culture is defined by a series of values and preferences regarding focus and modes of organization. In terms of focus, organizations either focus on the external or internal environment, and they prefer high degrees of flexibility in their ways of organizing, or high degrees of stability and control. These preferences have an impact on the main ends the organization considers important and on the preferred means to achieve them.

Findings indicate that organizational culture at the University tends to be of the internal process model, in which there is a focus on the internal environment and a high preference for stability and control, over flexibility. This is evident in the preference for centralized decision-making, which as also been signalled as useful in avoiding any potential corruption accusations, and I have argued that this leads to the separation of decision-making from the level where it would be most efficient, that of the middle-level managers who have the

necessary knowledge and motivation to adopt innovative solutions in environmentally-relevant areas. The structure of the university's budget reflects these preferences and its centralized and non-autonomous characteristics are seen as a barrier to the implementation of pro-environmental measures. Norton *et al.* (2015) have argued that for such organizations, motivations for engaging with sustainability increase when they are perceived to contribute to the financial wellbeing of the organization. This is evident in the priority accorded to energy policy, and the skillful use of this line of arguing of the Environmental Office, who emphasized the economic crisis as a driver of sustainable energy policy, as this contributes to cost reduction for the organization. These preferences for stability and control are also inclined to favour the concentration of responsibility in the hands of one office and, in this case, one person, although the appointment of an environmental coordinator has been found to have a weak effect on undertaking environmental initiatives in the organization (Lulfs and Hahn, 2013). However, in the case of the present case study organization, it is obvious that a line of organizational policy and measures has been put in motion since the Office of the Environment exists, which indicates that in this case, creating an office to deal with this policy domain has been necessary in order to kickstart the process of organizational change in a sustainable direction. The question remains, however, if after this start, the concentration of responsibility is the best way to organize environmental policy efforts at the University, if the goal is to promote pro-environmental behaviour among the University community, including both staff and students.

The lack of resources dedicated to the Office for the Environment is also an indicator of a culture that does not yet consider environmental sustainability to be part of its core. These

limitations have contributed to a lack of streamlining of procedures and organizational practices, which in turn make impossible the embedding of environmental criteria in regular decision-making processes at middle and high levels of management. The communication of pro-environmental policy is very weak, with most measures undertaken not being known by the wider university community, nor even by middle-level management. Policy is communicated in reports and on the Office´s webpage, but it does not reach the University community in a way that can influence their behaviour and stimulate a culture of sustainability or incentivize pro-environmental initiatives. Visibility of pro-environmental values through concrete manifestations such as regulations, policies, interventions, language and displayed behaviour of leaders is a pre-condition for the generation of a shared perception of organizational values, which is the basis of organizational climate, with research indicating strong evidence between this latter variable and pro-environmental behaviour (Norton *et al.*, 2015).

Although some interviewees argue that managers at the University are concerned with environmental issues and have demonstrated efforts to implement policy to promote both emissions´ reductions through infrastructure adaptation and pro-environmental behaviour through awareness and educational campaigns, learning opportunities for both staff and students seem to be scarce at the University. Studies focusing on organizations that are considered to have achieved an environmental organizational culture according to the definition provided above show that both training programs to behave sustainably and having formal structures in place to empower employees to shape organizational approaches to sustainability are important elements in organizational transitions to sustainability (Casler *et*

al., 2010). Furthermore, it has been argued that organizational culture is reflected in the social norms present in the organization, which are reflected in and created through the behaviour of leaders on the one hand, and of peers on the other. Results so far provide some indication that the behaviour of leaders is not seen as reflecting a commitment with environmental objectives, but further inquiry into this particular aspect is warranted by previous research results which indicate that exemplary pro-environmental behaviour of leaders and leadership support of employees´ pro-environmental behaviour are important determinants of behaviour (Blok et al., 2014), as well as both descriptive and injunctive norms (Robertson and Barling, 2013; Norton et al., 2014). For example, Robertson and Barling (2013) found that the environmental descriptive norms that leaders uphold, together with their pro-environmental behaviour played a key role in the greening of organizations and that leaders influence employees by sharing their values, by establishing a relationship with their employees, by providing intellectual stimulation and by being the source of inspirational motivation. In a similar vein, Norton *et al.* (2014) found a differential effect of organizational injunctive and descriptive norms on prescribed and voluntary pro-environmental behaviour: they demonstrated that organizational injunctive norms mediate the relationship between perceptions of organizational policy and prescribed task-related behaviour, while perceptions of descriptive norms mediates the relationship between policy perceptions and voluntary behaviour. The role of both social norms and policy perceptions, as variables that express relevant individual perceptions of organizational context, will be analyzed in Study 3. Also, as individual behaviours contributing to the overall sustainability performance of organizations in particular have been researched much less frequently (Lulfs and Hahn, 2013), and have often focus on the behaviours of top management (Lo *et al.*, 2012b), a decision was made to

focus Study 3 on individual pro-environmental behaviours and individual-level factors that might determine them.

5. Study 3: The role of individual factors influencing pro-environmental behaviours at the University

5.1. Introduction

The previous studies reported here have painted a nuanced picture of the structural and organizational context in which pro-environmental behaviour of both staff and students at the University takes place. Although the university has included its commitment to sustainability into its organizational plans and strategies, and has operationalized them in a program of infrastructure and behavioural change campaigns, it was also obvious that policies are still perceived as being token gestures by workers and students, while they at the same time considered their peers to give importance to sustainable practices in several areas. From the analyses of the previous two studies it is not yet evident to what extent contextual conditions promote pro-environmental behaviour in the workplace.

The impact and contribution that individual workers can make in terms of improving an organization's environmental performance through engaging in environmentally sustainable workplace behaviour has been under-represented (Davis and Challenger 2013). Several individual factors have been found to be significant determinants of pro-environmental behaviour in the home, but much less research has been undertaken for the workplace. While in the workplace, individual behaviour is constrained by organizational structures and formal and informal rules, it is still the case that people bring with them their values, identities, personal norms and patterns of behaviour, which have an influence on their interactions with others and their adaptation at the organizational structures and culture they find in place.

Organizations also differ in the degree of freedom and autonomy workers are allowed, with universities being a type of organization where such autonomy is higher compared to, say, assembly-line workers in a factory producing trucks (see García-Mira and Dumitru, 2014). In organizations in which workers have more autonomy, for example, the influence of individual psychological factors on environmentally-relevant behaviour is likely to be higher, as well as the influence of peer-interaction, than in organizations where a hierarchical structure and the type of work act as stricter constraints on behaviour.

Tha main research question Study 3 aims at answering is:

> How can it go beyond incentivizing low-effort pro-environmental behaviour, to promoting a context in which workers and students have the autonomy to champion organizational and societal change?

A series of more specific research questions were formulated for this study, listed below:

Q4. What is the role of social influence processes on pro-environmental behaviour in the workplace? In particular, what is the effect of social norms on the environmentally-relevant behaviour of both staff and students?

Q5. What is the role of individual psychological factors in determining pro-environmental behaviour at the university?

Q6. What is the relationship between behaviour at work and behaviour at home for university staff and students? Is there any transference of behaviour between the two domains?

To answer the proposed research questions, two methodological strategies were used: the first involved carrying out an analysis of individual factors influencing pro-environmental behavior at the University, for both staff and students, as well as behavioral transference between home and work (M.S.3); the second involved the formulation and testing of two predictive models of pro-environmental behaviour at the University that would account for the role of individual moral considerations, on the one hand, and social influence processes on the other.

5.2. Description of the questionnaire

In order to fulfil these objectives, a questionnaire was used for this study. The questionnaire used a series of established scales for the measurement of factors belonging to the categories of knowledge, motivations and ability, as described below, and its initial version was formulated by Ruepert, Steg & colleagues (2012), with local norms dimensions initially formulated by Bonnes & colleagues. This version was then adapted to fit the case study organization, which included revisions of social norms items and a few additions of items to measure social norm transmission. A different strategy for data analysis was used in this study, as compared to the other case studies included in the LOCAW project.

The individual factors explored as determinants of pro-environmental behaviour in organizations within this research belong to three categories, considered as the most relevant in previous research, and these are knowledge, motivations and ability (Bamberg and Moser, 2007; Stern, 2000; De Groot and Steg, 2007; Ajzen, 1987; Bonnes et al., 2007, Uzzell et al.,

2002; García-Mira, 2009; Stern and Dietz, 1994). As it is visible, factors belonging to both rational choice and normative theories of pro-environmental behaviour were included.

Within the category of knowledge, worldviews were included; for motivation, both distant and more proximal antecedents were considered and these were values, identity, and personal and social norms. For ability, measures of both self-efficacy and outcome efficacy were selected. Finally, a series of behaviours were measured both at home and at work, in the three categories of interest: consumption of materials and energy, waste generation and management, and work/study related mobility. The same questionnaire was applied to both workers and students, with small adaptations to reflect the reality of these two groups. Thus, for local norms, students were asked only about the behaviour of teachers and peers, while workers were asked about peers, middle management and higher level management.

Knowledge

Worldviews have been defined as a set of assumptions about the physical and social reality which may have powerful effects on cognition and behaviour (Koltko-Rivera, 2004). Within the domain of pro-environmental behaviour the most recent approach on worldviews is provided by research on the new paradigm of human interdependence (Corral-Verdugo *et al.*, 2008) which refers to a set of assumptions around the relationship between nature conservation and human progress, considering that these are functionally and temporally

interdependent. People differ on the degree to which they endorse this perspective of interdependence. *Worldviews* were measured with six items from the New Human Interdependence Paradigm scale (NHIP; Corral-Verdugo *et al.,* 2008). These items were: 'Human beings can progress only by conserving nature's resources', 'Human beings can enjoy nature only if they make wise use of its resources' and 'Human progress can be achieved only by maintaining ecological balance', 'Preserving nature now means ensuring the future of human beings', 'We must reduce our consumption levels to ensure the well-being of present and future generations', 'If we pollute natural resources today, people in the future will suffer the consequences'. Scores could range from 1 (totally disagree) to 7 (totally agree).

Motivation

In terms of motivation, the first factor considered was *values*, defined as a set of trans-situational goals which serve as guiding principles in the life of a person or social entity (Schwartz, 1994). Four main types of values have been distinguished in previous research on pro-environmental behaviour: biospheric, altruistic, egoistic and hedonic. People who endorse values beyond their immediate own interests, that is, biospheric and (to a lesser extent) altruistic values are more likely to engage in pro-environmental behaviour (e.g. De Groot and Steg, 2007, 2008), while those with strong self-enhancing values, such as hedonic and egoistic are less likely to adopt pro-environmental behaviours (Steg, Perlaviciute, Van der Werff, and Lurvink, 2014).

Values were measured through a 16-item scale (Steg, Perlaviciute, Van der Werff and Lurvink, 2014). Participants rated the importance of each value as a guiding principle in their

life on a scale from -1 (opposed to my values) up to 7 (of supreme importance). Four categories of values were included: biospheric, altruistic, egoistic and hedonic.

Biospheric values were represented by 4 items (*Respecting the earth*: harmony with other species; *Unity with nature*: fitting into nature; *Protecting the environment*: preserving nature; *Preventing pollution*: protecting natural resources). Altruistic values were also measured with 4 items (*Equality:* equal opportunities for all; *A world at peace*: free of war and conflict; *Social justice*: correcting injustice, care for the weak; *Helpful*: working for the welfare of others).

Egoistic values were measured with five items (*Social power*: control over others, dominance; *Wealth:* material possessions, money; *Authority*: the right to lead or command; *Influential*: having an impact on people and events; *Ambitious*: hard-working, aspiring). Finally, hedonic values were measured with 3 items (*Pleasure:* joy, gratification of desires; *Enjoying*: enjoying food, sex, leisure etc.; *Self-indulgent*: doing pleasant things).

Further motivational factors explored were *identity*, and both *personal* and *social norms*. For identity, three dimensions were considered within the workplace: *environmental self-identity, environmental organizational identity and organizational identification. Self-identity* reflects the label used to describe ourselves (Cook et al., 2002). When this is applied to the environmental domain, the environmental self-identity reflects the extent to which you see yourself as a type of person who acts pro-environmentally (Van der Werff, Steg, and Keizer, 2013; Whitmarsh and O´Neill, 2010).

Environmental organizational identity refers to the degree to which the organization is perceived as defining itself as pro-environmental, as the image the organization projects to its

employees is likely to affect whether they contribute to or comply with pro-environmental policy in the workplace. This factor can also be considered a proxy for organizational climate, which has been defined as employees´ shared perceptions of pro-environmental policies, procedures and practices that the organization rewards and supports (Norton *et al.*, 2014).

The dimension of *organizational identification* was also considered, defined as the degree to which a worker identifies with the organization (Mael and Ashforth, 1992).

Environmental self-identity was measured with three items: 'Acting pro-environmentally is an important part of who I am', 'I am the type of person who acts pro-environmentally' and 'I see myself as a pro-environmental person'. These items were adapted from Van der Werff *et al.* (2013). Environmental organizational identity was measured with three items: ´UDC aims to reduce its environmental impact'; 'UDC is the kind of organization that tries to reduce its environmental impact' ´UDC finds it important to reduce its environmental impact´. Finally, organizational identification (Mael and Ashworth, 1992) was measured with three items as well: ´When someone criticizes UDC, it feels like a personal insult´; ´UDC´s successes are my successes´; ´When someone praises UDC, it feels like a personal compliment´. Scores on these items could range from 1 (totally disagree) to 7 (totally agree).

Norms have been found to be among the most relevant determinants of pro-environmental behaviour (Carrus, Nenci, and Caddeo, 2009; Fornara, Carrus, Passafaro, and Bonnes, 2011; García-Mira, Real Deus, Durán, and Romay, 2003; Schultz, Khazian, and Zaleski, 2008) Nolan, Schultz, Cialdini, Goldstein and Griskevicius, 2008). Besides social norms, personal norms have also been found to be a predictor of pro-environmental behaviour (Stern, 2000; Schwartz, 1992) and they have been defined as self-expectations regarding own behaviour or

feelings of moral obligation to act a certain way. Local norms refer to normative influence deriving from social interactions that are localized in the specific places where the behaviours are performed. This study explored the role of these three categories of norms on pro-environmental behaviour in the workplace. Local norms can also be understood as perceptions of local circumstances and immediate events, thus constituting a key element of organizational climate (Schein, 2010) and included both superiors and peers, as they have been shown to have a differential impact on behaviour (Norton *et al.*, 2014).

General descriptive norms were measured with four items reflecting to what extent respondents' believed that a certain reference group acts pro-environmentally at work (cf. Ajzen, 2006). 'Most people who are important to me act pro-environmentally at work', 'Most of the people from my city act pro-environmentally at work', 'Most Spaniards act pro-environmentally at work', and 'Most people in general act pro-environmentally at work'. The four items for *local descriptive norms* were similar but referred to people at their workplace: The four items for local descriptive norms were similar but referred to people at their workplace: 'Most of my subordinates act pro-environmentally at work', 'Most of my co-workers act pro-environmentally at work', 'Most of my supervisors act pro-environmentally at work', and 'Most members of my management team act pro-environmentally at work'. The same was done for *general* and *local injunctive norms*. General injunctive norms were measured with the following items (cf. Ajzen, 2006): 'Most people who are important to me think I should act pro-environmentally at work', 'Most of the people from my city think I should act pro-environmentally at work', 'Most Spaniards think I should act pro-environmentally at work', and 'Most people in general think I should act pro-environmentally

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at work'. Local injunctive norms were measured as follows: 'Most of my subordinates think I should act pro-environmentally at work', 'Most of my co-workers think I should act pro-environmentally at work', 'Most of my supervisors think I should act pro-environmentally at work', and 'Most members of my management team think I should act pro-environmentally at work'.

Personal norms were measured with 4 items based on Steg and de Groot (2010): 'I feel guilty if I do not act pro-environmentally at work', 'I feel morally obliged to act pro-environmentally at work, 'I feel proud when I act pro-environmentally at work', and 'I would violate my principles if I would not act pro-environmentally at work'. All items related to norms were scored on a scale ranging from 1 (totally disagree) to 7 (totally agree). All norm scales showed high internal consistency, overall, as well as in each case study area (see Table 6). Therefore, mean scores of items included in the relevant scales were computed.

For the purposes of this study*, norm transmission* was measured by asking the following question: How often do you encourage the following people to act pro-environmentally at work? The respondents rated the frequency of this behaviour on a scale from 1 (never) to 7 (always), for four categories of people: subordinates, co-workers, supervisors and the management team. Also, a question was introduced on the *perception of having an exemplary role* within the organization, with two answer options (yes, no).

Ability

Finally, the ability to act pro-environmentally was conceptualized as efficacy in this study. A distinction was made between self-efficacy, defined as the confidence and perceived control

that people experience to execute sustainable behaviour (Ajzen, 2006), and outcome efficacy, defined as the extent to which people think they can do something about environmental problems by acting pro-environmentally (Schwartz, 1977).

Both *self-efficacy* and *outcome efficacy* were measured with three items each. The self-efficacy scale consists of three items: 'For me acting pro-environmentally at work is not costly', 'For me acting pro-environmentally at work is easy', and 'For me acting pro-environmentally at work is feasible' (cf. Ajzen, 2006), on a scale ranging from 1 (totally disagree) to 7 (totally agree).

Outcome efficacy was measured by three items: 'I can make a positive contribution to the quality of the environment by acting pro-environmentally at work', 'Environmental quality will enhance when I act pro-environmentally at work', and 'I can contribute to reducing environmental problems by acting pro-environmentally at work' (cf. Steg and De Groot, 2012). All items were scored on a scale ranging from 1 (totally disagree) to 7 (totally agree).

Behaviour at work and at home

Besides the factors described above, the questionnaire measured the frequency of a list of environmentally-relevant behaviours both at work and at home. Behaviours were chosen from three categories of environmentally-relevant behaviour in the workplace: consumption of materials and energy, waste generation and management, and work-related mobility. Socio-demographic data was also collected. Answers were provided on a scale ranging from 1

(totally disagree) to 7 (totally agree), with the exception of the scale for values, which ranged from -1 (opposed to my values) to 7 (supreme importance).

Several behaviours were measured in the three categories of interest. In total, 27 items were used to measure behaviour at work. For *work-related mobility,* examples of items were: 'How many kilometres per week do you on average commute by car?', 'How many kilometres per week do you in average travel for work?', 'When you drive for work, how often do you carpool rather than drive alone?'. For *energy use* in the workplace, the following items were used, for example: 'How many hours a day are the lights on at your workspace?' Personal control over lighting, heating and air-conditioning questions were included. Finally, for *recycling at work* items such as: 'How often do you use recycled paper at work?', 'How often do you separate your paper from the regular garbage at work?' were used.

Pro-environmental behaviour at home was measured in a similar way as pro-environmental behaviour at work. Items concerning transport, lighting, electrical devices, heating, air-conditioning, washing and bathing were included.

Self-reported recycling at home was measured with six items: 'How often do you use recycled paper at home?', 'How often do you separate your batteries from the regular garbage at home?', ''How often do you separate your glass from the regular garbage at home?', 'How often do you buy goods with minimum packaging?', and 'How often do you refuse plastic bags in stores?' (For the full questionnaire, go to Appendix 2).

The questionnaire was distributed and collected via the online program Qualtrix. Participants filled out the online questionnaire consisting of three parts. First participants were asked some general questions about their personal situation (such as age and gender) and the extent they

believe to have and exemplary role in their organization. This was followed by the second part comprising questions about motivational factors (i.e. values and environmental self-identity). All items on worldviews, environmental self-identity, norms and efficacy scales were randomized to make sure that the order of the questions did not influence the responses. Third, participants completed a set of questions on pro-environmental behaviour at work and at home. The data were collected between May and June 2012 for workers and between September and October 2012 for students.

The online questionnaire was distributed to the whole university staff, which includes all academic and administrative personnel, through an email asking for their collaboration in the research project, distributed through the corresponding University Office, who agreed to use these channels to target the entire university community. An email was sent to the University staff on behalf of the research group explaining the objectives of the research and asking for collaboration in filling in the web-based questionnaire. The student questionnaire was sent to a common email list that includes all registered students of the University of A Coruna. The questionnaire was available in the two official languages of the region, Castilian and Galician. Respondents could choose the language they preferred.

5.4. Results: workers´sample

Characteristics of the sample of workers

A total of 382 questionnaires were collected through the Qualtrix on-line platform, of which 182 were in Galician language and 200 in Castilian. However, only 178 subjects (47,4%) responded to all the items of the questionnaire. Data analysis was performed for this subset of 178 respondents.

Regarding gender, the sample was well balanced, with more women having completed the full questionnaire: 77 (43,3%) were male, and 101 (56,7%) were female. Ages vary between 25 and 66, with the mean age being of 43.51. Considering that the case study is a University, the level of education of the participants is very high, as can be seen in table 5.4.1.

Table 5.4.1 Level of education of the worker sample.

Education	Frequency	%
High School	5	2,8
College degree	41	23
Master-level degree	21	11,8
Doctorate-level degree	102	57,3
Other	9	5,1
TOTAL	**178**	**100**

Regarding the staff category to which the respondents belong, the majority were part of the teaching and research staff (PDI), and a smaller percentage (almost 29%) belonged to the financial and administrative staff category. The data differentiated between management-level positions and those members with no management level positions (see table 5.4.2).

Table 5.4.2. Role and position in the organization

Education	Frequency	%
Teaching/research staff in management positions (Dean, Head of Department…)	12	6,7
Administrative staff in management positions (Heads of services or financial departments)	2	1,1

Scale	Subscale	Alpha
Teaching/Research staff with no management positions	115	64,6	
Administrative staff with no management positions	49	27,5	
TOTAL	**178**	**100**	

Internal reliability analyses

Alpha-Cronbach coefficients were calculated for each scale, and all are presented in Table

5.4.3. As a result, every scale was considered valid for further analyses.

Table 5.4.3 Reliability analyses (Alpha-Cronbach)

Scale	*Subscale*	*Alpha*
Values	Biospheric values(Items 2, 5, 6, 11, 13 and 14)	.88
	Hedonic values(Items 4, (7), 10 and 15)	.76
	Egoistic values(Items 3, 7, 8, 12, and 16)	.69
	Altruistic values(Items 1, 9, and (13))	.69
Efficacy	Efficacy	.85
Worldviews	Worldviews	.88
Norms	Descriptive norms: General	.83
	Injunctive norms: General	.85
	Descriptive norms: Local	.81
	Injunctive norms: Local	.79
	Personal norms	.83
Identity	Environmental Self-identity	.90
	Environmental Organizational Identity	.92
	Organizational Identification	.86
Norm transmission		.91

Confirmatory factor analyses of variables

A factor analysis was carried out with the 16 items measuring values. The method of principal

components was used and a rotated solution (Varimax) was searched for, obtaining a clear

structure of 4 factors, accounting for 62,72% of the variance (see Table 5.4.4).

The first factor, labelled as "Biospheric", groups together the following value items: a) Unity with nature, b) Protecting the environment; c) Respecting the Earth; d) Preventing pollution; e) Helpful; and f) A world at peace. The item "Helpful" also loaded on another factor, with a coefficient of .449.

The second factor, labelled as "Hedonic", groups the following value items: a) Enjoying life; b) Self-indulgent; and c) Pleasure; d) Wealth.

The third factor, labelled as "Egoistic", groups the following items: a) Authority; b) Influential; c) Social power; d) Ambitious; e) Wealth (which also loads on the second factor).

The fourth factor, labelled as "Altruistic", groups the following value items: a) Social justice; b) Equality; c) Helpful.

Table 5.4.4. Rotated solution deriving four separate factors (biospheric, hedonic, egoistic, and altruistic) for the value scale, and accounting for 62,72% of the variance.

	Componente			
	F1. Biospheric	F2. Hedonic	F3. Egoistic	F4. Altruistic
V. Unity with nature	,889			
V. Protecting the environment	,860			
V. Respecting the Earth	,829			
V. Preventing pollution	,824			
V. Helpful	,519			,449
V. A world at peace	,514			
V. Enjoying life		,851		
V. Self-indulgent		,818		
V. Pleasure		,763		
V. Authority			,792	
V. Influential			,714	
V. Social power			,674	
V. Ambitious			,543	
V. Wealth		,410	,474	
V. Social justice				,802
V. Equality				,734

Although the four-factor structure has also been confirmed in previous research, the structure of each of the factors does not fit the original conceptualization, for the workers sample. It thus seems that discrimination between at least the altruistic and the biospheric dimensions is not clearcut. A decision was made to perform further analyses, in order to check for a more parsimonious structure. When all the items are introduced as *input* for a hierarchical cluster analysis, two big and well-differentiated clusters emerge, grouping "Altruistic", "Biospheric", and "Hedonic" under one cluster. *Figure 5.4.1* shows this rather clearly.
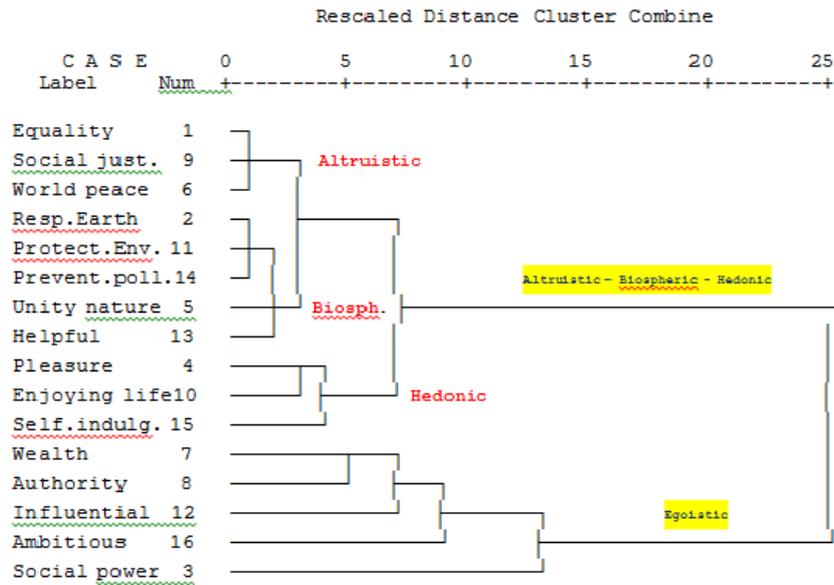
Figure 5.4.1 Dendogram using Average Linkage (Between Groups), derived by Hierarchical Cluster Analysis for the 16 items related to values.

This raises the question of whether the altruistic, biospheric, and hedonic value structures really form three separate factors or not. If clusters are illustrated together with the output derived in a common space by a multidimensional scaling technique, the obtained solution also confirms this two-factor solution (see *Figure 5.4.2*). While the lack of discrimination between altruistic and biospheric was to be expected, the hedonic value dimension poses some explanatory problems, as hedonic values have been considered self-enhancing, while the other two are considered self-transcendent (Schwartz and Howard, 1981).
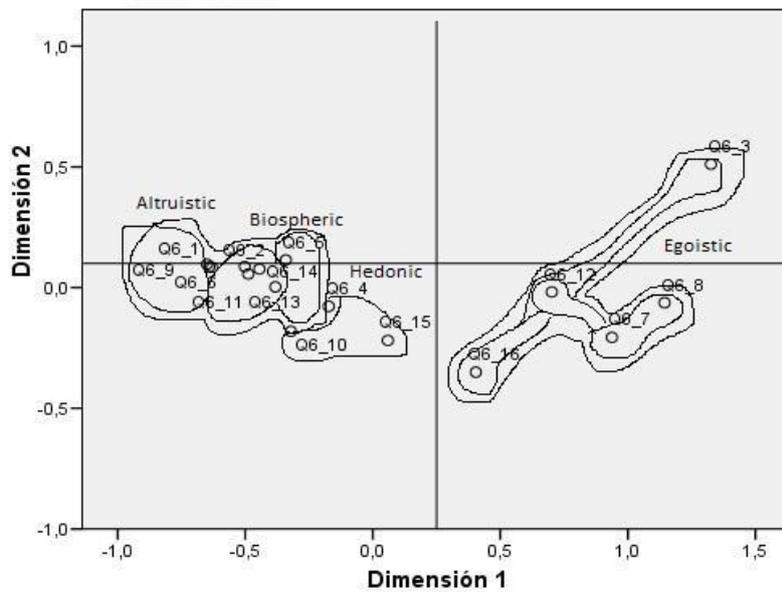
Figure 5.4.2 Joint representation of the clusters and the points in the common space derived by multidimensional scaling for the social values, using PROXSCAL.

Self- and outcome efficacy

A factor analysis was carried out with the 6 items measuring perceived efficacy. The method of principal components was used and a rotated solution (Varimax) was aimed at, obtaining a clear structure of 2 factors, accounting for 72,25% of the variance (see Table 5.4.5).

The first factor, labelled as "Self-efficacy", refers to the perceived feasibility of acting pro-environmentally, and as such, is a measure of the perceived ability to act.

The second factor, labelled as "Outcome efficacy", refers to the perception that one´s behaviour would have a significant outcome in terms of environmental consequences, and thus relates to the perceived impact of behaviour.

This rotated solution clearly shows a two-factor structure with a good discrimination of the contribution of each of the factors to the accounted-for variance.

Table 5.4.5. Rotated solution deriving two separate factors (self-efficacy and outcome-efficacy) for the Efficacy scale, accounting for 72,25% of the variance.

	Component	
	F1 – Personal cost	F2 – Env improvement
EF. For me acting pro-environmentally at work is easy	,888	
EF. For me acting pro-environmentally at work is not costly	,806	
EF. For me acting pro-environmentally at work is feasible	,799	
EF. Environmental quality will enhance when I act pro-environmentally at work		,857
EF. I can contribute to reducing environmental problems by acting pro-environmentally at work		,824
EF. I can make a positive contribution to the quality of the environment by acting pro-environmentaly at work		,770

Decomposing norms

A factor analysis was carried out with all the items measuring norms: a) General descriptive norms; b) General injunctive norms; c) Local descriptive norms; d) Local injunctive norms; and e) Personal norms. The method of principal components was used and a rotated solution

(Varimax) was aimed at, obtaining a structure of five factors, accounting for 84,95% of the variance (see Table 5.4.6).

The first factor was labelled "*Descriptive norms*", because it mainly groups those items referring to both general and local descriptive norms. Other items grouped within this factor referred to injunctive or personal norms, and also load on Factor 2.

The second factor was labelled as "*Injunctive norms*", because it groups all those items which refer to both general and local injunctive norms.

The third factor is a mix of items related to both injunctive and descriptive norms, which makes it a rather inconclusive factor. The items with most factorial weight are the ones referring to descriptive norms.

The fourth factor was labelled "*Personal norms*". Personal norms refer to feelings of moral obligation to act in a pro-environmental manner.

Finally, the fifth factor was labelled "*Descriptive norms_distal*". It puts together two general items referring to what other people in the city, or Spaniards in general, do in terms of acting pro-environmentally at work. This is a very general descriptive norm factor.

This structure does not confirm the proposed structure of norms for this research, and it introduces some doubts about the division between general and local norms in the sense that individuals do not seem to discriminate very well between these two types of norms. The differentiation between descriptive and injunctive norms receives more support, although the dimensions are not clearly differentiated either, as the factors show some overlap in all factors, with the more pure factor being the "Injunctive norms" factor (F2).

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Table 5.4.6 Rotated solution deriving five separate factors for the Norms scale, accounting for 84,95% of the variance.

	Components				
	F1-Descriptive norms	F2-Injunctive norms	F3-Mixed descriptive/injunctive	F4-Personal norms	Descriptive norms - distal
DNL. Most members of my management team act pro-environmentally at work	,893				
DNG. Most of my neighbors act pro-environmentally at work	,825				
DNL. Most of my work subordinates act pro-environmentally at work	,777				
INL. Most members of my management team think I should act pro-environmentally at work	,611	,476			
PN. I feel proud when I act pro-environmentally at work	,492	,428		,468	
ING. Most of my neighbors think I should act pro-environmentally at work		,891			
ING. Most of the people from my city think I should act pro-environmentally at work		,879			
ING. Most people in general think I should act pro-environmentally at work		,810			
INL. Most of my subordinates think I should act pro-environmentally at work	,528	,706			
ING. Most people who are important to me think I should act pro-environmentally at work		,594		,466	
DNG. Most people in general act pro-environmentally at work	,402		,860		
DNL. Most of my coworkers act pro-environmentally at work			,819		
DNL. Most of my supervisors act pro-environmentally at work			,804		
ING. Most Spaniards think			,772		

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I should act pro-environmentally at work					
INL. Most of my supervisors think I should act pro-environmentally at work			,747		
PN. I feel morally obliged to act pro-environmentally at work				,932	
PN. I would violate my principles if I would not act pro-environmentally at work				,812	
PN. I feel guilty if I do not act pro-environmentally at work	,538			,606	
INL. Most of my coworkers think I should act pro-environmentally at work	,550	,472		,589	
DNG. Most people who are important to me act pro-environmentally at work	,441			,545	
DNG. Most of the people from my city act pro-environmentally at work					,882
DNG. Most Spaniards act pro-environmentally at work			,441		,791

Método de extracción: Análisis de componentes principales.
Método de rotación: Normalización Varimax con Kaiser.
a. La rotación ha convergido en 10 iteraciones.

A cluster analysis was carried out to help with the interpretation of the factors. Again, the initial categorization as general or local was not clear, with different ways of approaching descriptive or injunctive norms depending on the referents the individuals take into consideration. A number of clusters, linked to two main branches suggest the possibility of a more parsimonious conceptualization of norms, but with more difficulties for a clear interpretation (see the dendogram of the cluster analysis in Figure 5.4.3).
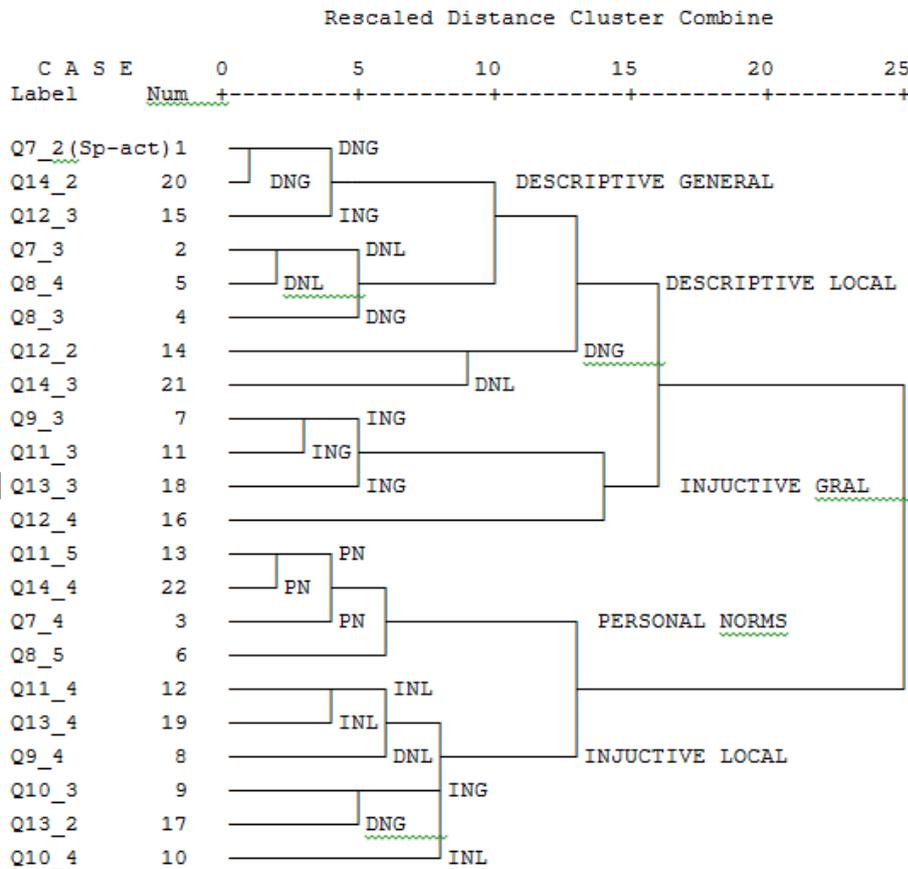
Figure 5.4.3. Dendogram using Average Linkage (Between Groups), derived by Hierarchical Cluster Analysis for the 22 items related to norms.

As a considerable amount of previous research has already demonstrated, normative influences are among the most important motivations for human behaviour. However, the present analyses show that referents that people take into account and that exercise influence on their specific behaviours are not easily differentiated in local or general, proximal or distal, or even (although to a lesser extent) descriptive and injunctive. It is likely that, as classical experimental norm research has already shown (Cialdini *et al.*, 1991) different references are activated in different contexts and are highly contingent upon specific situations, exercising

their influence at the same time. This would explain why the underlying structure is not entirely verified.

Identity: personal and organizational

A factor analysis was carried out with all the items measuring identity. The method of principal components was used and a rotated solution (Varimax) was aimed for, obtaining a very clear structure of three factors, accounting for 83,28% of the variance (see Table 5.4.7).

The first factor was labelled "*Environmental Organizational Identity*" (EOI), because it mainly groups those items referring to the individual perception that the university is the type of organization that puts effort into supporting pro-environmental policy and behaviour. As mentioned before, this could be considered a proxy for organizational climate as well.

The second factor, labelled as "*Environmental Self-identity*" (ESI), groups the three items that refer to acting pro-environmentally as part of a person´s concept of the self.

The third factor was labelled *"Organizational Identification"*(OI), and it measures the degree to which an individual identifies with the organization.

Table 5.4.7. Rotated solution deriving three separate factors for the Identity scale, accounting for 83,28% of the variance.

	Componente		
	F1-Environmental Organizational Identity	F2-Environmental self-identity	F3-Organizational Identification
EOI. UDC finds it	,923		

important to reduce its environmental impact			
EOI. UDC aims to reduce its environmental impact	,907		
EOI. UDC is the kind of organization that tries to reduce its environmental impact	,900		
ESI. I see myself as a pro-environmentally person		,926	
ESI. I am the type of person who acts pro-environmentally		,903	
ESI. Acting pro-environmentally is an important part of who I am		,865	
OI. When someone criticizes UDC, it feels like a personal insult			,909
OI. When someone praises UDC it feels like a personal compliment			,885
OI. UDC's successes are my successes			,775

Método de extracción: Análisis de componentes principales.
Método de rotación: Normalización Varimax con Kaiser.
a. La rotación ha convergido en 4 iteraciones.

Checking for spillover between behaviours at work and behaviours at home

In order to check for the possibility of spillover between behaviours at work and behaviours at home, correlation analysis was performed. Several types of spillover can be conceived, theoretically:

a. Transference of the same behaviours (behaviours in the same category) between the two life domains of work and home (e.g. sustainable mobility at work spilling over into sustainable mobility at home or vice versa).

b. Transference among categories of pro-environmental behaviour in the same life domains (e.g. recycling at work spilling over into energy saving at work).

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c. Transference among categories of pro-environmental behaviour and among life domains (e.g. recycling at work leading to more energy saving or more sustainable mobility behaviour at home or vice versa.

Transference between work and home within the same pro-environmental behaviour category

Correlation analysis was performed to check for indicators of spillover within the same behavioural category. For the category of mobility, some correlations were significant between work-related mobility behaviours and private mobility behaviours. However, the majority of these were rather weak (see table 5.4.8), pointing to a low level of behavioural transference between home and work, with the exception of ´driving in an energy efficient way´, which seems to be consistent across the two domains. This behaviour in particular is more likely to be an acquired habit and that the motivation for it has to do more with driving skills and with a gain motivation to both prolong the life of the vehicle and use fuel efficiently, than with pro-environmental concerns.

Table 5.4.8 Significant correlations between mobility behaviours at work and at home

Behaviours	Correlation coefficients
Frequency of commuting/traveling for private reasons by car	.41
Number of km on average for work and for private reasons	.34
Frequency of traveling for business trips and travelling for private reasons by car	.30

Driving in an energy efficient way at work and for private reasons	.82
Frequency of carpooling for work/driving with others for private reasons	.38

All correlations were significant at p ≤ .01

Regarding transference of energy behaviours between the two domains, again it seems that transference does not occur much. Only three of the behaviours measured show significant correlations (see Table 5.4.9), and all of them are rather weak, with the average temperature setting being a bit higher. This latter behaviour might be explained more by levels of personal temperature comfort, than by a pro-environmental behaviour being transferred between work and home.

Table 5.4.9. Significant correlations between energy behaviours at work and at home

Behaviours	Correlation coefficients
Frequency of switching computer off when going home/leaving devices on standby at home	-.21
Average temperature settings at work and at home	.49
Frequency of turning heating on at work and at home	.37

All correlations were significant at p ≤ .01

The most significant results were obtained among behaviours at work and at home in the waste management category (see table 5.4.10). As the recycling behaviour scales showed good internal reliability, correlation analyses were performed on the whole scale, and a statistically significant strong positive relation was obtained (r square = .63, p ≤ .01). It seems that recycling behaviour is the only category of behaviours that might be transferred across the two life domains. This might be due to the fact that recycling has been one of the areas targeted by repeated campaigns both in the private domains and by different organizations,

which normally start with the easier to implement sustainability measures as part of their corporate social responsibility strategy. Also, it might be that contextual similarities between work and home for recycling behaviour might support the transference of this behaviour, as it has been argued that blending environmental characteristics might contribute to the weakening of borders between home and work (Uzzell *et al.*, 2012). Recycling infrastructure is similar, as the same municipal company provides services both in the surrounding communities and at the University. Streamlining contextual conditions for the performance of pro-environmental behaviour might thus play an important role in the transference of behaviours between the two domains. The similarity of context also needs to go beyond the external infrastructure characteristics, to also reinforce personal responsibility over behaviour (e.g. by providing workers with information of the impact of their either individual or collective (per building or department) behaviour on the overall environmental performance of the University, and to provide information about the economic costs of their behaviour, as it naturally happens in the home. As the organization is a public one, it is not likely nor even desirable that costs be personally assumed. However, through mechanisms such as perceptions of identification with the organization, which are related to employee wellbeing and the perception that the organization cares about its employees (Mael and Ashworth, 1992), could promote responsible behaviour among employees.

Table 5.4.10 Correlation analysis between waste management behaviours at work and at home

		RECYCLING_ AT_WORK	RECYCLING_ AT_HOME
RECYCLING_AT_WOR K	Pearson Correlation	1	,633(**)

	Sig. (2-tailed)		,000
	N	178	178
RECYCLING_AT_HOME	Pearson Correlation	,633(**)	1
	Sig. (2-tailed)	,000	
	N	178	178

** Correlation is significant at the 0.01 level (2-tailed).

Transference among categories of pro-environmental behaviour in the same life domain

Correlations between one behavioural domain and another at work are also very low, showing that people who adopt sustainable practices in one category such as recycling, do not necessarily do so in another, such as energy use. This might be due to both contextual factors supporting pro-environmental behaviour at the University in some areas but not in others, and to the fact that behaviours in different domains might have different determinants, as they also entail different levels of personal cost. Significant correlations are found only among a limited number of behaviours, and they are below .25 in all cases. Given this very weak correlations, a decision was made to not present these here.

Transference among categories of pro-environmental behaviour and among life domains

No positive correlations were found between behaviours pertaining to different behavioural domains across the two life contexts of work and home. This was to be expected, given the low transference of behaviours even within the same behavioural category.

that the evidence obtained for the existence of spillover between life domains and categories of behavior is very limited. This might be due to a variety of reasons: first, the contexts of

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work and home are governed by different logics which trigger different kinds of behaviours. At home, the costs of unsustainable behaviours are experienced by households and individuals in a direct way. That is not the case with energy or mobility behaviours at work. However, the results found for recycling behaviour support the view that behaviour change and transference of behaviours between one life domain and another are possible under certain conditions. Furthermore, Study 1 and 2 showed a mixed picture in terms of support the University provides to the pro-environmental behaviour of its employees. If behaviour is not strongly supported within the organization, and conditions are not created for workers to learn and perform pro-environmental behaviour in the workplace, it is unlikely that this will be transferred to the home, especially when policies focus more on infrastructure change and remain invisible, due to a weak communication and dissemination strategy. For behaviours to be transferred from work to home, they need to be consciously carried out and be experienced as autonomous choices, in order for behaviour to have an impact on personal factors such as identity or moral norms which might in turn promote pro-environmental behaviour in other areas of life. If the opposite direction is considered, with behaviours being translated from home to work, previous evidence from the LOCAW project indicated that the kinds of changes people have reported having done in the last years at home belong to the areas of saving paper, saving water and recycling, which are relatively low-cost behaviours on which government policy has campaigned intensively. Furthermore, bringing even these into the workplace requires a context that supports and rewards employee initiatives and has structures in place through which useful initiatives or suggestions are carried up the hierarchical ladder and rolled out into the organization. This does not seem to be the case of the studied university, as Study 2 indicates. More costly and impactful behaviours such as mobility have

not been sufficiently targeted by government policy, at least in Spain, and when they have been, policy has been contradictory (e.g. on the one hand introducing municipal bicycle programs and on the other supporting the auto industry with subsidies and customer support for purchasing new cars; or building bicycle lanes for only a part of the city thus making it difficult to take the bicycle as the main means of transportation even when there is willingness etc.).

Research in two transnational corporations within the LOCAW project has also indicated that third spaces, those which are not home but not entire work either, such as cafeterias, spaces for relaxation in organizations and sometimes offices at certain times and with certain activities, hold a great potential for pro-environmental behaviour promotion, as they bring down the walls or weaken the strong borders between home and the workplace. This result is especially relevant for the University, where especially academic staff enjoys a significant degree of liberty in customizing work spaces in ways that resemble home. Furthermore, cafeterias and on-campus restaurants could be used as transition spaces in which pro-environmental behaviour could be cued and activated. However, it is exactly in those spaces where environmental practices are inexistent and where possibilities for change exist, as workers consider these practices important and have changed some of them in a sustainable direction in their homes. The one example one interviewee could provide of direct bottom-up demand for more pro-environmental policy had to do with introducing organic food in the cafeterias. Interventions in these spaces could be set in place at the University and their effects measured in terms of both effectiveness and possibilities for spillover to other work

categories of practices. Such a policy could potentially bring significant results for both workers and students in terms of encouraging pro-environmental behaviour at the University.

The University could set conditions in place to promote pro-environmental behaviour in the workplace and set the conditions in place for both workers and students to translate these behaviours to other areas of life. Workers and students could also organize through unions and other representative bodies within the organization to promote initiatives and formulate demands for certain levels of environmental performance. The same applies to the relationship between the University and the municipal and regional governments.

Testing the role of individual factors on pro-environmental behaviour in the workplace

As the results of Study 3 have shown, workers who act pro-environmentally in one domain do not necessarily do so in another. This raises the question of what determines behaviour in each of the categories of interest, or even for each specific behaviour. The behavioural items chosen for this study were those that are known to be highly relevant in terms of environmental impact, so understanding determinants of specific behaviours is very important, in order to design and implement measures that can contribute to significant emissions reduction by organizations. As described before, a series of behavioural antecedents that have previously been identified as key determinants of pro-environmental behaviour in the literature were measured. Regression analyses were performed for each of the measured behaviours in order to check for the predictive power of values, efficacy, norms, worldviews, and identity factors. The most significant results are reported here. Models that were

significant but explained variance below 20 % were not reported here, as they do contribute

significantly to the already existing knowledge base.

Predicting mobility behaviour at work

A number of behaviours at work related to mobility were considered as dependent variables, and a regression analysis was carried out independently for each mobility behaviour. A choice was made to focus on those behaviours that referred to the adoption of environmentally friendly mobility options, as these were the most interesting for the purposes of this study.

Dependent variable: Frequency of sustainable transport choices for short work trips (less than 5 km)

For short distances, injunctive norms predict the use of other means of transportation rather than car use (Table 5.4.11 shows this variable accounts for 45,7% of the variance). What significant others think I should do determines a great deal what means of transportation I use.

Table 5.4.11 Results of the multiple regression analysis. Procedure: Stepwise. Dependent variable: "When you travel for work and need to make a trip of less than 5km, how often do you use public transportation a bicycle or walk rather than drive by car?"

Mod elo	R	R cuadrad o	R cuadrado corregida	Error típ. de la estimació n	Estadísticos de cambio				
					Cambio en R cuadrado	Cambio en F	gl1	gl2	Sig. Cambio en F
1_IN	,706[a]	,498	,457	1,697	,498	11,920	1	12	,005

The power of injunctive norms for this particular behaviour is highly relevant, as this is one of those behaviours where individual freedom from contextual constraints is higher, given that infrastructure limitations may not have such a significant effect on shorter trips, as it might be the case for home-work commuting. The power of social norms is visible for this particular behaviour and it can be used for interventions to target car-use reductions by the organization.

Dependent variable: Driving in an energy efficient way when going to work

Norms also have predictive power when the dependent variable is driving in an energy-efficient way, when commuting for work purposes (see Table 5.4.12). Nevertheless, personal norms are more influential for this behaviour then for the previous one. This makes sense considering that the way to drive is a relatively private and thus invisible behaviour that is more likely to be carried out by those holding feelings of moral obligation to act pro-environmentally. It is worth noting the high relevance of only one normative factor for this particular behaviour as well, with a high variance explained.

Table 5.4.12 Results of the multiple regression analysis. Procedure: Stepwise. Dependent variable: "When you commute or drive for work purposes, how often do you drive in an energy efficient way?"

Modelo	R	R cuadrado	R cuadrado corregida	Error típ. de la estimación	Estadísticos de cambio				
					Cambio en R cuadrado	Cambio en F	gl1	gl2	Sig. Cambio en F

1_PN	,721[a]	,520	,480	1,157	,520	12,981	1	12	,004

a. Variables predictoras: (Constante), F4-Personal norms

Dependent variable: When you drive for work, how often do you carpool rather than drive alone?

The behaviour of carpooling is predicted by two factors: environmental organizational identity and norm transmission. Thus, the perception that the organization is doing things to enhance its pro-environmental performance, together with the stated encouragement of others to behave pro-environmentally (which can be considered a proxy for a role assumption which goes beyond a mere fulfilment of work tasks), explain 51 % in the variance of this behaviour. It thus seems that, for this particular sample, organizational climate and the assumed role as educators might be significant in adopting more sustainable mobility options, together with the perception that the organization is encouraging these types of behaviours (see Table 5.4.13). Norms and other researched dimensions are not at all important here, and this might be related to the fact that carpooling in general is not a common option in Spain, and thus it is not an object of normative consideration, while the University´s Office for the Environment (UOE) has started to mention the carpooling option as a pro-environmental option in its campaigns. This might explain why the variable of environmental organizational identity is relevant here, as people who consider the organization to be active in promoting pro-environmental behaviour are more likely to use this option. Also, the UOE has promoted a bicycle service on campus, thus making visible that the University is active in promoting sustainable mobility options.

Table 5.4.13. Results of the multiple regression analysis. Procedure: Stepwise. Dependent variable: "*When you drive for work, how often do you carpool rather than drive alone?*"

Modelo	R	R cuadrado	R cuadrado corregida	Error típ. de la estimación	Estadísticos de cambio				
					Cambio en R cuadrado	Cambio en F	gl1	gl2	Sig. Cambio en F
1_EOI	,553[a]	,306	,248	1,882	,306	5,284	1	12	,040
2_NT	,770[b]	,593	,519	1,505	,287	7,759	1	11	,018

a. Variables predictoras: (Constante), F1.- Env. Organiz. Identity

b. Variables predictoras: (Constante), F1.- Env. Organiz. Identity, Norm_transmission

Taken together, these results show that normative influences are very important in work-related mobility behaviours, and a lesser role seems to be played by the organizational identity. Normative influences can be used by organizations in a positive way, to design strategies that can be effective in promoting behaviour change. However, the results of the previous studies reported here (especially the in-depth interviews – see Study 2) showed that management perceives the widespread use of the car by staff and students at the university to be indicative of a descriptive norm supporting widespread car use and to consider this a situation in which there is low pressure from the bottom-up to engage more actively with the mobility problem of the University. Passivity is thus justified on both sides by assigning responsibility to the other (managers to staff and staff to managers and structural conditions). However, the observable evidence of increased bicycle use by staff, which led to an incentive to increase the number of bicycles available on campus, demonstrates that change is not only possible, but might be welcome by workers, even in the absence of organized pressure to change environmental policy at the University.

Also, the lack of influence of other individual level factors on mobility behaviours confirms what previous studies have indicated about the importance of structural and contextual factors on the adoption of sustainable means of transport (Lo *et al.*, 2013). As mobility is highly determined by available infrastructure and structural conditions such as urban planning strategies, and has proven to be one of the areas of behaviour where individually-determined change is hardest, these results are not surprising. Furthermore, the specific case study, the University of A Coruaa, does no provide effective alternatives for car use, due to its location, dependence on municipal and regional authorities for decisions regarding mobility, and a belief among its managers that there exists a regional culture of car-dependence, together with a belief that this culture might translate into political losses if policy entails a loss in comfort and convenience (see Study 2). However, social norms play an important role at least for some behaviours, such as choosing sustainable alternatives for short work-related trips, and this could provide margin for normative interventions from the University. This would also contribute to a strengthening of shared perceptions of an environmentally-promoting organizational climate, thus potentially cascading into increases in pro-environmental behaviour frequency among workers. It is worth noting that influential factors for mobility in the workplace have to do with social influence and organizational factors, rather than individual values, worldviews or identities.

Predicting energy use behaviour at work

Regression analysis was used to find out which of the considered factors better predict workplace pro-environmental behaviour. The following factors were considered as predictors: a) 4 Value factors; b) 2 Efficacy factors; c) 5 Norm factors; and d) 3 Identity factors.

A number of behaviours at work related to energy use were considered as dependent variable, and a regression analysis was carried out independently for each of the considered behaviours. Again, only results of regression analyses in cases where models explained at least 20 % of the variance in the criterion variable are reported here.

Dependent variable: How many hours a day are the lights on at your workspace?

Environmental self-identity seems to have some relation to the use of lights during the day. In this analysis this dimension of self-identity was slightly related to the number of hours staff have the lights on at the workplace (see Table 5.4.14). Considering oneself to be a person who acts pro-environmentally seems to explain a quarter of the total variance in the number of hours the lights are kept on at the office, which is relatively low. Qualitative analyses presented in the previous study pointed out to a few possible explanations: one refers to structural problems of some of the buildings, which were not designed with environmental criteria in mind, and thus not oriented towards the best possible utilization of natural light during the day. One interviewee actually mentioned that his office, which received a lot of natural light during the day due to a whole crystal wall, was actually making it necessary to lower the blinds and turn on the office lights, in order to be able to carry out his office work. Another potential explanation refers to other functions keeping the lights on might have, such as the signalling of commitment to work or presence in the office, which is supported by an

organizational culture with preferences for control and stability over flexibility. A third might

have to do with the perception that the organization is not necessarily doing enough or caring

enough for environmental issues (as the perception of the importance attributed by the

University to different environmental practices was generally low) which might drive

individual workers to not be willing to act pro-environmentally in the workplace. However,

within these constraints, workers do have a certain degree of autonomy over the amount of

time they keep the lights on, and it is here where environmental self-identity might come into

play. A word of caution is important here: the questionnaire did not include an item on the

total number of hours one spends in the office on general, so there is no way of knowing if

this variable influences how many hours they have the lights on. This should be included as a

control variable in future studies.

Table 5.4.14 Results of the multiple regression analysis. Procedure: Stepwise. Dependent variable: "*How many hours a day are the lights on at your workspace*?"

Mod elo	R	R cuadrado	R cuadrado corregida	Error típ. de la estimación	Estadísticos de cambio				
					Cambio en R cuadrado	Cambio en F	gl1	gl2	Sig. Cambio en F
1_E SI	,559[a]	,313	,250	3,607	,313	5,008	1	11	,047

a. Variables predictoras: (Constante), F2.- Env. Self-Identity

Dependent variable: How often do you have the lights on at your workspace when there is no

one in there?

Although the total number of hours the lights are on in the office might constitute an informative indicator if energy consumption, it is also a relatively general one, and it might also have to do with other factors such as the number of hours staff spends in the office, which for the academic staff at the university, it tends to be rather flexible and varied, depending on the number of hours they teach, the quantity of research they do and how much of it they do from home. For these reasons, a behaviour which is potentially more related to pro-environmental intentions was also measured, which is the frequency with which workers leave the lights on when there is no one in the office. For this particular behaviour, it seems that organizational identification is the only factor that plays a role (see Table 5.4.15). However, in this particular case, organizational identification favours unsustainable behaviour, as the more workers identify with the organization, the more they leave the lights on in their workspace when there is no one there. This result can be explained in the light of the findings of Study 2, which indicated that organizational culture favours an internal process model, in which formal structures and procedures are key elements in the organizational understanding of efficiency. This is also reflected in the perspective of at least one interviewee, who mentioned the need to leave lights on when leaving the office, as a way to signal presence and avoid potential, even if implicit sanctions. Within this organizational culture, it has been argued that encouraging pro-environmental behaviour should be framed as efficiency, which in the case of energy could work well, if this was emphasized as something the organization valued (Norton *et al.*, 2015).

Table 5.4.15 Results of the multiple regression analysis. Procedure: Stepwise. Dependent variable: "*How often do you have the lights on at your workspace when there is no one in there*?"

Mod elo	R	R cuadrado	R cuadrado corregida	Error típ. de la estimación	Estadísticos de cambio				
					Cambio en R cuadrado	Cambio en F	gl1	gl2	Sig. Cambio en F
1_OI	,655[a]	,429	,381	,508	,429	9,007	1	12	,011

a. Variables predictoras: (Constante), F3.- Organizat. Identification

It is important to notice that only these two energy behaviours could be predicted by some of the measured, and one of them actually indicates how organizational identification can act as a barrier for pro-environmental behaviour. This is a striking result which has two possible and compatible interpretations: one is that a part of energy-related behaviours are not under the control of the worker, and workers are aware of this reality, as Study 1 showed. The ones that are under the control of workers, such as turning the lights on and off, or putting computers on stand-by seem to be much more influenced by elements of the organizational culture that does not favour sustainable behaviour in spite of the fact that environmental policy at the University is focused a lot on energy policy. Although changing sources of energy and favouring energy-efficiency infrastructure plays an important role in reducing emissions, if these are not communicated well and accompanied by behaviour change methods, an important opportunity is missed in terms of further reductions of emissions as well as the strengthening of individual behavioural antecedents such as environmental self-identity that could promote transference of practices from one behavioural domain to another.

Predicting waste management behaviour at work

Regarding this third dimension of waste management, regression analysis was again used to find out which factors better predict behaviours in this category. The following factors were again considered as predictors: a) 4 Value factors; b) 2 Efficacy factors; c) 5 Norm factors; and d) 3 Identity factors.

A number of waste management behaviours at work were considered as dependent variables, and a regression analysis was carried out independently for each of them.

Dependent variable: How often do you use recycled paper at work?

Altruistic and biospheric values seem to be related to the frequency with which workers use recycled paper at work (see Table 5.4.16). This makes sense especially in the light of the intensive policy the university has undertaken to raise awareness for the positive impact of the use of recycled paper in day-to-day university tasks and procedures. A relatively high percentage of behavioural variance (45%) is explained by these two categories of values, with each having a similar weight. Although the university has put effort into promoting recycled paper use at the University, this is still a voluntary behaviour (in the sense that the University did not limit choice through a policy of green purchasing). Values thus seem to play an important role for low-cost behaviours, when they can be freely chosen and when behaviour is encouraged by the organization. This particular behaviour also has high signalling value at the University, as it is part of the daily operations of staff (both academic and administrative), and especially for academic staff it has a signaling value, which will also have an impact on students.

Table 5.4.16 Results of the multiple regression analysis. Procedure: Stepwise. Dependent variable: *How often do you use recycled paper at work?*

Modelo	R	R cuadrado	R cuadrado corregida	Error típ. de la estimación	Estadísticos de cambio				
					Cambio en R cuadrado	Cambio en F	gl1	gl2	Sig. Cambio en F
1_Altruistic	,551[a]	,304	,246	1,356	,304	5,241	1	12	,041
2_Biospheric	,733[b]	,537	,453	1,156	,233	5,527	1	11	,038

a. Variables predictoras: (Constante), F4-Altruistic

b. Variables predictoras: (Constante), F4-Altruistic, F1-Biospheric

Dependent variable: How often do you separate your plastic from the regular garbage at work?

Identity and norms emerge again as important variables in accounting for the variance in the behaviour of separating plastic from regular waste (see Table 5.4.17). With a lower strength, biospheric values come into the equation. The model explains a good 69% of the total variance in behaviour, and shows that both psychological internal factors such as biospheric values and identity, and social influence processes through elements of both descriptive and injunctive norms, play a significant role in determining proper separation of plastic at work.

Table 5.4.17 Results of the multiple regression analysis. Procedure: Stepwise. Dependent variable: *How often do you separate your plastic from the regular waste at work?*

Modelo	R	R cuadrado	R cuadrado corregida	Error típ. de la estimación	Estadísticos de cambio

					Cambio en R cuadrado	Cambio en F	gl1	gl2	Sig. Cambio en F
1_ESI	,603[a]	,363	,310	1,831	,363	6,849	1	12	,023
2_Norms	,771[b]	,595	,521	1,526	,232	6,288	1	11	,029
3_Biospheric	,875[c]	,765	,695	1,218	,170	7,247	1	10	,023

a. Variables predictoras: (Constante), F2.- Env. Self-Identity

b. Variables predictoras: (Constante), F2.- Env. Self-Identity, F3-Mixed descriptive and injunctive

c. Variables predictoras: (Constante), F2.- Env. Self-Identity, F3-Mixed descriptive and injunctive, F1-Biospheric

Dependent variable: At work how often do you read emails from the computer screen rather than printing them?

Descriptive norms are the only variables that seem to be significant in predicting this particular behaviour (see table 5.4.18). What distant others do accounts for 24 % of the variance, indicating that this particular behaviour has become a common practice at wider societal levels.

Table 5.4.18 Results of the multiple regression analysis. Procedure: Stepwise. Dependent variable: *At work how often do you read emails from the computer screen rather than printing them?*

Modelo	R	R cuadrado	R cuadrado corregida	Error típ. de la estimación	Estadísticos de cambio				
					Cambio en R cuadrado	Cambio en F	gl1	gl2	Sig. Cambio en F
1_DN	,553[a]	,306	,248	1,004	,306	5,293	1	12	,040

a. Variables predictoras: (Constante), F5-Descriptive norms_distal

Dependent variable: At work how often do you use as little paper as possible when printing (e.g. 2 pages per paper, two-sided, etc?

The mixed factor of descriptive and injunctive norms is the most important predictor of this particular behaviour, accounting for a similar percentage of the variance as for the previous behaviour (see Table 5.4.19). For intentional behaviours of reducing the use of paper it seems normative influence plays the most important role. This makes sense considering that the use of paper is a relevant behaviour at the University, serving the main functions of teaching and research, and thus being easily subjected to social influence, as staff would be mindful of how others do their jobs and motivated to display normative behaviour. This behaviour seems to have become common and also to be perceived as something that others expect one to do.

Table 5.4.19 Results of the multiple regression analysis. Procedure: Stepwise. Dependent variable: *At work how often do you use as little paper as possible when printing (e.g. 2 pages per paper, two-sided, etc?*

Modelo	R	R cuadrado	R cuadrado corregida	Error típ. de la estimación	Estadísticos de cambio				
					Cambio en R cuadrado	Cambio en F	gl1	gl2	Sig. Cambio en F
1_Norms (mixed)	,555[a]	,308	,250	1,475	,308	5,342	1	12	,039

a. Variables predictoras: (Constante), F3-Mixed descriptive and injunctive

The role of exemplarity in pro-environmental behaviour at work: recycling and encouraging others to act

After investigating the role of different individual factors on pro-environmental behaviour at work, I also aimed to explore the importance of a factor that might be relevant in the self-

definition of University staff, especially when it comes to academic staff: the perception that one´s behaviour is exemplary, that it constitutes a reference for others (especially students, but also the wider society, as the academic status is often associated to being a role model). As mentioned before, one item was introduced to measure the perception of exemplarity, which was: "Do you have an exemplary role in the University? That is, do people at the University take your behaviour as an example" (answer options were "yes" and "no"). In table 5.4.20, you can see the distribution of the sample for this particular item:

Table 5.4.20 Sample distribution regarding exemplary role in the organization

		Frecuencia	**Porcentaje**	**Porcentaje válido**	**Porcentaje acumulado**
Válidos	Yes	101	56,7	56,7	56,7
	No	77	43,3	43,3	100,0
	Total	178	100,0	100,0	

As the two groups were not so different in size, which allowed for performing inter-group comparisons, a series of T-tests for mean comparisons were performed, to see whether there were differences between the two groups, both in terms of actual pro-environmental behaviour, and for the behaviour of norm transmission, understood as encouraging others to act pro-environmentally at the University (see table 5.4.21). I looked at the differences in recycling behaviour, as the most consistent category of pro-environmental behaviour at work. The T-test was significant at $p \leq .05$ (F=.281).

Table 5.4.21 Differences in recycling behaviour per exemplary role in the organization

Estadísticos de grupo					
	GQ. Exemplary role in the organization	N	Media	Desviación típ.	Error típ. de la media
RECYCLING_AT _WORK	Yes	101	4,7888	1,64298	,16348
	No	77	4,2987	1,56682	,17856

Furthermore, the T-test was performed for the behaviour of encouraging others to act pro-environmentally at work, which also gave positive results, the mean difference being significant at p≤.01 (F=.011) (table 5.4.22).

Table 5.4.22 Differences in norm transmission per exemplary role in the organization

Estadísticos de grupo					
	GQ. Exemplary role in the organization	N	Media	Desviación típ.	Error típ. de la media
Norm_transmission	Yes	101	4,2698	1,78700	,17781
	No	77	3,4221	1,76975	,20168

It thus seems that those that perceive their role in the organization to be exemplary tend to recycle more at work, as well as to encourage others more often to behave pro-environmentally, at least as compared with those who do not perceive their role to be exemplary. As this result is quite interesting for the implications it can have for interventions targeting the creation of virtuous loops that would promote pro-environmental behaviour among both staff and students, I explored further the factors influencing norm transmission only among those that consider their role to be exemplary (table 5.4.23). A regression analysis was performed on this particular group. The results show that norms play a very important role for this particular group in their initiatives to encourage others to act pro-environmentally at work. Personal norms, the feelings of moral obligation to act pro-environmentally at work,

are the most important determinant of norm transmission behaviour, followed by descriptive

norms and injunctive norms. Thus, members of staff at the university that consider their

behaviour exemplary tend to encourage others to act when they themselves feel morally

compelled to do so and feel others also endorse such behaviour.

Table 5.4.23. Explaining norm transmission at work

Modelo	R	R cuadrado	R cuadrado corregida	Error típ. de la estimación	Estadísticos de cambio				
	GQ. Exemplary role in the organization = Yes (Seleccionado)				Cambio en R cuadrado	Cambio en F	gl1	gl2	Sig. Cambio en F
1_PN	,678[a]	,460	,400	1,60686	,460	7,676	1	9	,022
2_DN	,858[b]	,737	,671	1,19030	,276	8,402	1	8	,020
3_IN	,928[c]	,861	,801	,92617	,124	6,213	1	7	,041

a. Variables predictoras: (Constante), F4-Normas: Personal norms
b. Variables predictoras: (Constante), F4-Normas: Personal norms, F3-Normas: Descriptive Norms (mixed))
c. Variables predictoras: (Constante), F4-Normas: Personal norms, F3-Normas: Descriptive Norms (mixed), F2-Normas: Injunctive norms

This model explains 80 % of the variance in norm transmission, a very significant percentage,

with personal norms accounting for half of the explained variance. This result points to a very

important entry point for organizational interventions to support pro-environmental behaviour

at the University. A relatively high percentage of workers at the university (56%), and

especially academic staff (constituting the majority) consider their role to be exemplary, as

Study 3 findings shows. For this category, feelings of moral obligation to act pro-environmentally and the sense that others endorse these behaviours constitute key predictors of the frequency with which they engage in encouraging others to act pro-environmentally. If adequately supported and incentivized by the organization, norm transmission could really be enhanced at the University to both workers and students. Mechanisms based on social influence seem to play a very significant role in both direct pro-environmental behaviour at the University (behaviour they perform themselves), as well as in the indirect behaviour of encouraging others to act.

Testing predictive models of pro-environmental behaviour at the University: the workers´ case

The results of the regression analyses performed to determine significant predictors of pro-environmental behaviour at work indicated a few interesting results, with social influences processes playing a very important role in predicting behaviour, and environmental self-identity and both altruistic and biospheric values playing a role in a very limited number of cases. However, these factors are interrelated and some of the general antecedents of behaviour such as values might actually not directly predict behaviour, as previous empirical tests of classical theories have shown (e.g. Bamberg and Moser, 2007), and organizational pro-environmental behaviour research has confirmed (Lo *et al.*, 2012b), but rather act as predictors of other, more specific antecedents of behaviour. Although our previous results are more supportive of a model that emphasizes the role of social influence processes on pro-environmental behaviour at work, a test wa performed first of a model based on classical normative theories of pro-environmental behaviour, in which values constitute the most

general antecedents of pro-environmental behaviour (Stern, 2000), which was theoretically defined by Ruepert, Steg et al. (2012), and also tested for the other cases included in the LOCAW project. As recent research has shown that environmental self-identity might play an important role as an antecedent of pro-environmental behaviour (Whitmarsh and O´Neill, 2010), and that self-identity is stronger when one endorses biospheric and altruistic values (Van der Werff *et al.*, 2013), the model assumes that values will influence self-identity. In turn, self-identity will have an influence on outcome efficacy, as seeing oneself as a pro-environmental person will lead to considering one´s contribution as valuable to protecting the environment. Finally, it was assumed that considering one´s contribution as worthwhile will lead to the activation of feelings of moral obligation to act pro-environmentally, which in turn will influence pro-environmental behaviour. Feelings of moral obligation have been shown to be a significant predictor of pro-environmental behaviour both in the household (Howard and Schwartz, 1980; Hunnecke et al., 2001; Steg and de Groot, 2010), and at work (Lulfs and Hahn, 2013).

A Structural Equation Model Analysis was performed using Amos to test how the model fit the data. The model was only tested for recycling behaviour at work, as personal norms were only correlated with this category of behaviours. The full model can be seen in Figure 5.4.4. I report the Bentler-Bonnet fit index (CFI) and the root mean square error of approximation indicator (RMSEA), both considered to be important fit indicators for structural equations models (Byrne, 2010): CFI = .89, and RMSEA= .06. While the RMSEA indicator is considered valid up to .08, with lower than .05 being considered optimal, the CFI index is considered valid beyond .90 (Hu and Bentler, 1999). Thus, although the model is close to

achieving the desired indicators of fit, to the model has to be rejected in its current form, as it does not provide a sufficient fit to the data. This is an interesting result, as this model had proven to have a good fit in the other case studies of the LOCAW project.
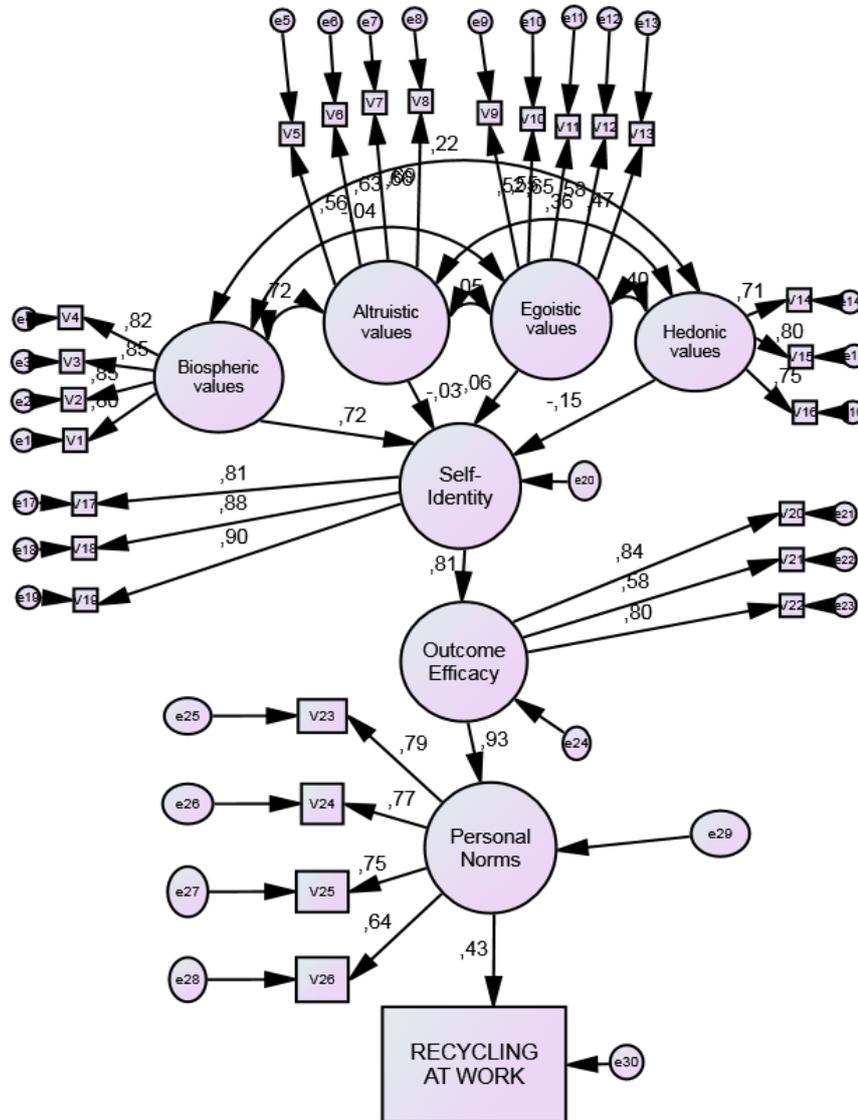
Figure 5.4.4 A path analysis model for explaining recycling behaviour at work for University staff. *Numbers indicate Beta weights (standardized estimates), which refer to the relative importance of a predictor.*

Further exploration should be carried out to identify the antecedents of recycling behaviour that would improve the explanatory power of the model. However, as Byrne has indicated, when such explorations are performed, one steps out of the confirmatory analyses and enters into an exploratory realm.

As this model did not provide an adequate explanation for the data, another model was tested, that emphasized the role of social norms as predictors of pro-environmental behaviour at work. Different categories of norms appeared as important predictors of recycling behaviour at the University in the previous regression analyses. Furthermore, different authors have extensively argued that social norms in general play an important role in pro-environmental behaviour at work (Ramus and Kilmer, 2007) and descriptive norms are especially important for voluntary pro-environmental behaviour (Norton *et al.*, 2015). Furthermore, University workers enjoy a relatively high degree of autonomy in terms of the behaviours they can display at work, so I considered that both descriptive general norms and descriptive local norms are likely to play an important role. Said differently, both what significant others do outside the workplace and what colleagues and superiors do in the workplace is likely to have an influence on pro-environmental behaviour. Descriptive norms are by definition models of what is possible and accepted as normal behaviour, and previous research has provided support for their relationship to the ability to perform a specific behaviour in organizations (Daily *et al.*, 2009; Lulfs and Hahn, 2013). As efficacy is defined as a person´s sense of competence to perform a specific behaviour given the appraisal of situational circumstances, I

postulated a link between descriptive norms and outcome efficacy. Furthermore, individuals learn new behaviours and develop a sense of personal competence, by first observing the behaviours of others and the consequences of those behaviours (Bandura, 2000). In other words, seeing others perform pro-environmental behaviour will impact on a person´s sense of the possibility of personal contribution and will make this contribution be perceived as worthwhile. Previous research has also shown that transformational leadership influences pro-environmental behaviour through employees´ efficacy beliefs (Strauss *et al.*, 2009), with personal mastery experiences playing an important role in efficacy beliefs. As in the previously tested model, it was considered that outcome efficacy will activate personal norms, which in turn will influence recycling behaviour at work. The full model can be seen in Figure 5.4.5.

Although a previous study has identified injunctive pro-environmental norms of leaders to have an influence on required behaviour of workers (Norton *et al.*, 2014), a decision was made to leave injunctive norms out, as the research reported here looked at employees´

voluntary behaviours on which injunctive norms seem to have a lower influence.
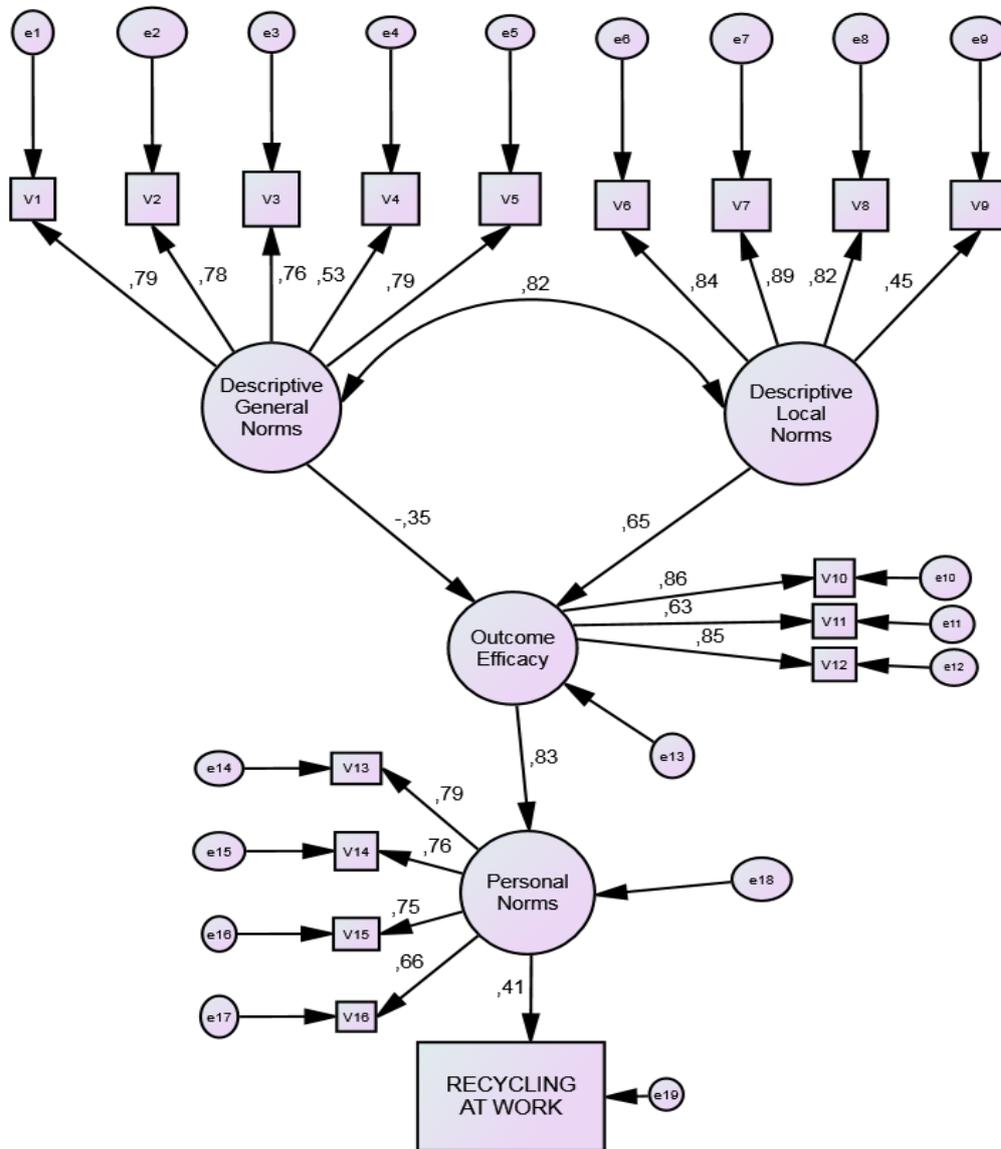
Figure 5.4.5 A social influence-based path analysis model to explain recycling behaviour of workers at the University. *Numbers indicate Beta weights (standardized estimates), which refer to the relative importance of a predictor.*

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The model has a good fit to the data, with CFI =.93 and RMSEA =.08. Both indicators are within accepted limits, and thus the model can be accepted as providing a good fit of the model to the data. What this model indicates is that by stimulating the formation of descriptive pro-environmental norms, the University can support worker pro-environmental behaviour. Descriptive pro-environmental norms in organizations can be stimulated by visible displays of exemplary behaviour, especially on the part of influential leaders, such as members of the management team. This will, in turn, stimulate a sense of outcome efficacy for workers, which in turn will influence their feelings of moral obligation to act pro-environmentally at work.

5.5 Results: students´sample

Characteristics of the sample

A total of 612 questionnaires were collected through the Qualtrix on-line platform, of which 327 were in Galician language and 295 in Castilian. As mentioned before, all the student population of the university was targeted through a common email, and data was gathered a few months later than the workers´data, between September and October of 2012. However, only 348 subjects (56,8%) responded to all the items of the questionnaire. Data analysis was performed for this subset of 348 respondents.

Regarding gender, women dominated the sample, with 232 respondents (66 %), while men made up a 33 % of the sample (116). In terms of the level of study, 75 % of the sample is made of undergraduate students, with 9,5 % attending Master studies, and 12 % being PhD students. Ages vary between 18 and 62, with the mean age being of 25,4.

Internal reliability analyses

The internal reliability of each scale was measured through the Alpha-Cronbach indexes, presented in Table 5.5.1. As a result, every scale was considered valid for further analyses.

Table 5.5.1 Reliability analysis (Alpha-Cronbach)

Scale	*Subscale*	*Alpha*
Values	Biospheric values(Items 2, 5, 11, 14)	.86
	Hedonic values(Items 4, 10, 15)	.76
	Egoistic values(Items 3, 7, 8, 12, 16)	.78
	Altruistic values(Items 1, 6,9 13)	.73
Efficacy	Efficacy	.84
Worldviews	Worldviews	.86
Norms	Descriptive norms: General	.75
	Injunctive norms: General	.84
	Descriptive norms: Local	.77
	Injunctive norms: Local	.79
	Personal norms	.86
Identity	Environmental Self-identity	.91
	Environmental Organizational Identity	.90
	Organizational Identification	.85
Norm transmission		.62

Confirmatory factor analyses of variables

A factor analysis was carried out with the 16 items measuring values. The method of principal components was used and a rotated solution (Varimax) was searched for, obtaining a clear structure of 4 factors, accounting for 63.7 % of the variance (see Table 5.5.2).

The first factor, labelled as "Biospheric", groups together the following value items: a) Unity with nature, b) Protecting the environment; c) Respecting the Earth; d) Preventing pollution.

The second factor, labelled as "Egoistic", groups the following value items: a) Authority; b) Influential; c) Social power; d) Ambitious; e) Wealth.

The third factor, labelled as "Altruistic", groups the following items: a) Social justice; b) Equality; c) A world in peace; d) Helpful.

The fourth factor, labelled as "Hedonistic", groups the following value items: a) Enjoying life; b) Pleasure; c) Hedonistic.

Unlike the workers´ case, which provided a 4-factor solution but the composition of the factors was somewhat mixed, for the student sample each factor is composed by the same items as theoretically derived. The solution accounts for a good percentage of the variance in the data. This indicates that values are more clearly defined at earlier ages and boundaries between them become more flexible with age and life experience. This is a very interesting result, also given the fact that most psychological research is undertaken with student populations. It indicates a need for value scales to be tested with adult populations of all ages and potentially refined. Other factors might also be at play that would explain this difference. It is possible that desirability plays a bigger role for University staff, given their awareness of their exemplary role. Further research into this topic is necessary to understand this result fully.

Table 5.5.2 Rotated solution deriving four separate factors (biospheric, egoistic, altruistic and hedonic) for the value scale, and accounting for 63,7% of the variance.

Matriz de componentes rotados[a]

	Componente			
	F1-Biospheric	F2-Egoistic	F3-Altruistic	F4-Hedonic
V. Unity with nature	,830			
V. Protecting the environment	,805			
V. Preventing pollution	,790			
V. Respecting the Earth	,790			
V. Authority		,855		
V. Social power		,739		
V. Influence		,738		
V. Wealth		,715		
V. Ambitious		,560		
V. Social justice			,822	
V. Equality			,712	
V. A world at peace			,705	
V. Helpful			,589	
V. Enjoying life				,859
V. Pleasure				,786
V. Hedonism				,770

Método de extracción: Análisis de componentes principales.
Método de rotación: Normalización Varimax con Kaiser.
a. La rotación ha convergido en 6 iteraciones.

Besides the four-factor structure confirmed in previous research, a more parsimonious structure can be obtained. When all the items are introduced as *input* for a hierarchical cluster analysis, two big and well-differentiated clusters emerge, grouping "Altruistic", "Biospheric", and "Hedonic" under one cluster. Figure 5.5.1 shows this rather clearly. Although in the students´ case the four-factor structure obtained through factor analysis provides a clear solution that fits the theoretical conceptualization, the variance explained is not excellent, which led to the search for a more parsimonious solution.
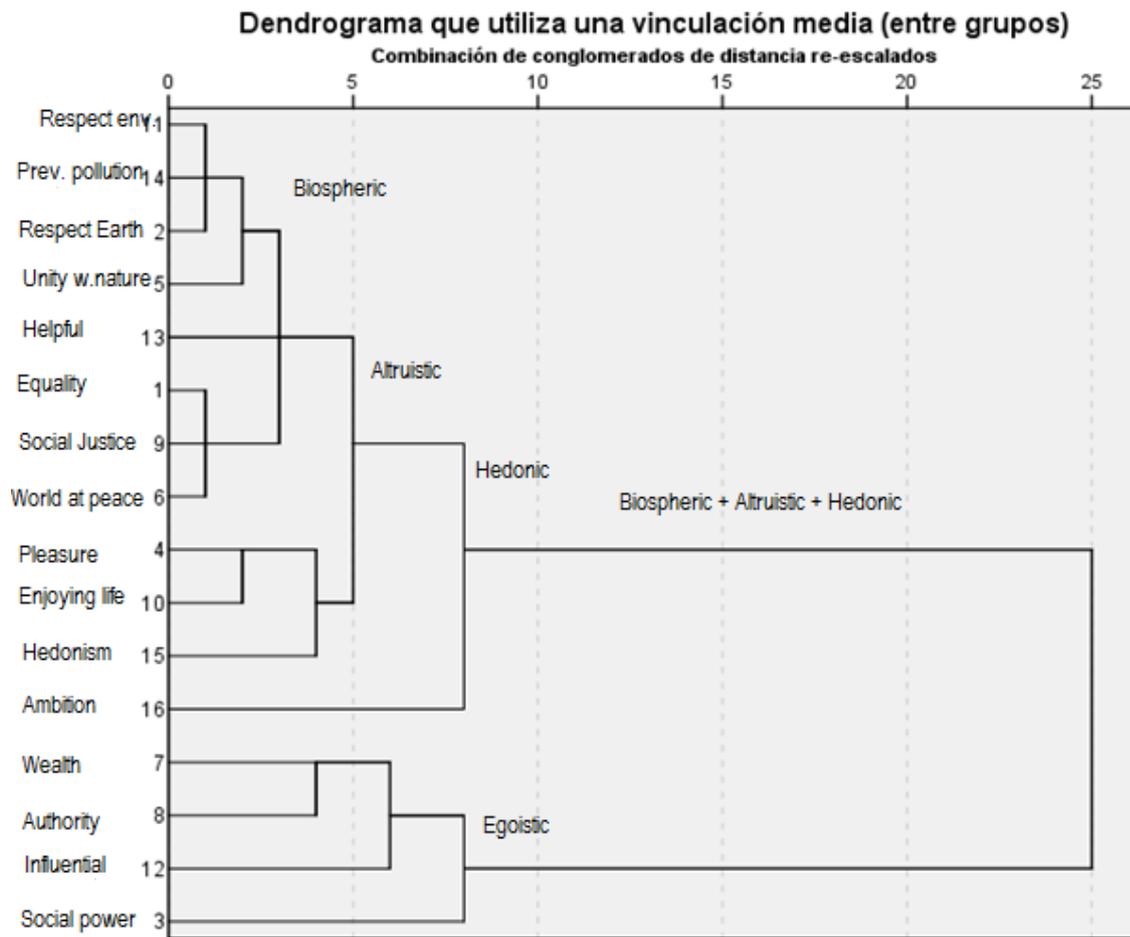
Figure 5.5.1 Dendogram using Average Linkage (Between Groups), derived by Hierarchical Cluster Analysis for the 16 items related to values.

Self- and outcome efficacy

A factor analysis was carried out with the 6 items measuring perceived efficacy. The method of principal components was used and a rotated solution (Varimax) was aimed at, obtaining a clear structure of 2 factors, accounting for 75,56% of the variance (see Table 5.5.3).

The first factor, labelled as "Self-efficacy", refers to the perceived feasibility of acting pro-environmentally, and as such, is a measure of the perceived ability to act.

The second factor, labelled as "Outcome efficacy", refers to the perception that one´s behaviour would have a significant outcome in terms of environmental consequences, and thus relates to the perceived impact of behaviour.

This rotated solution clearly shows a two-factor structure with a good discrimination of the contribution of each of the factors to the accounted-for variance.

Table 5.5.3 Rotated solution deriving two separate factors (self-efficacy and outcome-efficacy) for the Efficacy scale, accounting for 75,56% of the variance.

Matriz de componentes rotados[a]

	Componente	
	F1-Self-efficacy	F2-Outcome efficacy
For me, acting pro-environmentally at the	,877	
For me, acting pro-environmentally the Universy is easy.	,876	
For me, acting pro-environmentally at the University is feasible.	,758	
I can contribute to reducing environmental problems but acting pro-environmentally at the Universiy.		,843
I can make a positive contribution to the quality of the environment by acting pro-environmentally at the University.		,820
Environmental quality will enhance when I act pro-environmentally at the University.		,819

Método de extracción: Análisis de componentes principales.
Método de rotación: Normalización Varimax con Kaiser.
a. La rotación ha convergido en 3 iteraciones.

Decomposing norms

A factor analysis was carried out with all the items measuring norms: a) General descriptive norms; b) General injunctive norms; c) Local descriptive norms; d) Local injunctive norms; and e) Personal norms. The method of principal components was used and a rotated solution (Varimax) was aimed at, obtaining a structure of three clearly delineated factors, accounting for 67,47% of the variance (see Table 5.5.4).

The first factor was labelled "*Descriptive norms*", because it mainly groups those items referring to both general and local descriptive norms. Only one item pertaining to the ´Injunctive Norms´ category loads on two factors.

The second factor was labelled as "*Injunctive norms*", because it groups all those items which refer to both general and local injunctive norms.

This structure confirms the proposed structure of norms for this research, for the division between descriptive, injunctive and personal norms. However, it does not confirm the differentiation between general and local norms, as it does not seem that individuals discriminate well between them. It seems that for the student sample, university-specific referents are not distinguished as different from other important referents of normative influence. As the factorial solution was much clearer than in the workers case, further analyses on the structure of these factors were not deemed necessary.

Table 5.5.4 Rotated solution deriving three separate factors for the Norms scale, accounting for 67,47% of the variance.

Matriz de componentes rotados[a]

	Componente		
	F1- Descriptive norms	F2- Injunctive norms	F3 – Personal norms
Most Spaniards act pro-environmentally at their work or study place.	,827		
Most people in my city act pro-environmentally at their work or study place.	,794		
Most people in general act pro-environmentally in their work or study place.	,771		
The majority of my neighbours act pro-environmentally in their work or study place.	,740		
The majority of my colleagues act pro-environmentally at the University.	,690		
The majority of my professors act pro-environmentally at the University.	,638		
The majority of people that are important to me act pro-environmentally at their work or study place.	,552		
The majority of people in this country think I should act pro-environmentally at the University.	,531	,485	
Most of my colleagues think I should act pro-environmentally at the University.		,843	
The majority of people in my city think I should act pro-environmentally at the University.		,827	
In general, the majority of people think I should act pro-environmentally at the University.		,775	
The majority of my neighbours think I should act pro-environmentally at the University.		,765	
The majority of people that are important to me think I		,701	

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should act pro-environmentally at the University.			
The majority of my professors think I should act pro-environmentally at the University.		,688	
I feel morally obliged to act pro-environmentally at the University.			,851
If I do not act pro-environmentally at the University I feel guilty.			,840
I would violate my principles if I didn´t act pro-environmentally at the University			,829
I feel proud when I act pro-environmentally at the University.			,735

Método de extracción: Análisis de componentes principales.
Método de rotación: Normalización Varimax con Kaiser.
a. La rotación ha convergido en 5 iteraciones.

Identity: personal and organizational

A factor analysis was carried out with all the items measuring identity. The method of principal components was used and a rotated solution (Varimax) was aimed for, obtaining a structure of three factors, accounting for 82,80% of the variance (see Table 5.5.5).

The first factor was labelled "*Environmental Organizational Identity*" (EOI), because it mainly groups those items referring to the individual perception that the university puts effort into supporting pro-environmental policy and behaviour.

The second factor, labelled as "*Environmental Self-identity*" (ESI), groups the three items that refer to acting pro-environmentally as part of a person´s concept of the self or par of the self-construal.

The third factor was labelled *"Organizational Identification"*(OI)*, and it measures the degree to which an individual identifies with the organization.

This three-factor structure is clear and accounts for a significant proportion of the variance.

Table 5.5.5 Rotated solution deriving three separate factors for the Identity scale, accounting for 82,80 % of the variance.

Matriz de componentes rotados[a]

	Componente		
	F1-Env. Organizational Identity	F2-Environmental Self-identity	F3-Organizational Identification
UDC is the kind of organization that tries to reduce its environmental impact.	,881		
UDC finds it important to reduce its environmental impact.	,865		
UDC aims to reduce its environmental impact.	,853		
I see myself as a pro-environmentally person.		,920	
I am the type of person who acts pro-environmentally.		,915	
Acting pro-environmentally is an important part of who I am.		,888	
When someone praises UDC it feels like a personal compliment.			,896
When someone criticizes UDC, it feels like a personal insult.			,883
UDC's successes are my successes.	,480		,670

Método de extracción: Análisis de componentes principales.
Método de rotación: Normalización Varimax con Kaiser.
a. La rotación ha convergido en 5 iteraciones.

Checking for the existence of spillover between behaviours at work and behaviours at home

In order to check for the possibility of spillover between behaviours at work and behaviours at home, correlation analysis was performed. Several types of spillover can be conceived, theoretically:

a. Transference of the same behaviours (behaviours in the same category) between the two life domains of work and home (e.g. sustainable mobility at work spilling over into sustainable mobility at home or vice versa).

b. Transference among categories of pro-environmental behaviour in the same life domains (e.g. recycling at work spilling over into energy saving at work).

c. Transference among categories of pro-environmental behaviour and among life domains (e.g. recycling at work leading to more energy saving or more sustainable mobility behaviour at home or vice versa.

Transference between work and home within the same pro-environmental behaviour category
Correlation analysis was performed to check for indicators of spillover within the same behavioural category. For the category of mobility, some correlations were significant between university-related mobility behaviours and private mobility behaviours. However, the majority of these were rather weak (see table 5.5.6) indicating a low level of behavioural transference between home and work, with the exception of ´driving in an energy efficient way´, which seems to be consistent across the two domains. As already mentioned in the case of workers, this behaviour in particular is more likely to be an acquired habit and it is likely that the motivation for it has to do more with driving skills and with a motivation to take care of the car, than with pro-environmental concerns.

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Table 5.5.6 Significant correlations between mobility behaviours at the university and at home

Behaviours	Correlation coefficients
Frequency of commuting/travelling for private reasons by car	.46
Frequency of using sustainable transport for trips shorter than 5 km	.46
Driving in an energy efficient way at work and for private reasons	.71
Frequency of carpooling to the U/driving with others for private reasons	.47

All correlations were significant at p ≤ .01

Regarding transference of energy behaviours between the two domains, again it seems that transference does not occur much. Correlations are very low in general, so much so that a decision was made not to report them here. The explanation for this might be that students do not assume responsibility over space at the University, as they spend time either in common open spaces using their own computers, or in common lecture or study rooms, where responsibility is diffused among many people. Thus, this is probably best explained by the fact that different logics and rules of behaviour dominate the two life domains for students.

Recycling behaviours at home and at work also exhibit relatively low correlations, with the exception of the use of recycled paper (see table 5.5.7). It seems that, unlike staff, students do not consistently transfer these behaviours from one category to another. This is an interesting result, as one would expect the younger generation to be more knowledgeable about environmental issues and to have assumed a series of behaviours as default ones. The explanation might lie in the conditions found at the University, that might not encourage recycling behavior among students.

Table 5.5.7 Significant correlations between behaviours at university and behaviours at home in the recycling category.

Behaviours	Correlation coefficients
Using recycled paper	.67
Separating paper	.41
Separating plastic	.45
Separating other waste/separating batteries	.23
Buying with minimum package/using recycled paper at work	.35

All correlations were significant at p ≤ .01

Transference among categories of pro-environmental behaviour in the same life domains

Correlations between one behavioural domain and another at work are also very low, showing that people who adopt sustainable practices in one domain, do not necessarily do so for another. This might be due to both contextual factors supporting pro-environmental behaviour at the University in some areas but not in others, and to the fact that behaviours in different domains might have different determinants, as they also entail different levels of personal cost.

Transference among categories of pro-environmental behaviour and among life domains

No positive correlations were found between behaviours pertaining to different behavioural domains across the two life contexts of work and home. This was to be expected, given the low transference of behaviours even within the same behavioural category.

It can thus be concluded that evidence of spillover is very limited in the case of students too. This might be due to a variety of reasons: first, the learning context of the University and the

home are governed by different logics which trigger different kinds of behaviours (see Study 2). At home, the costs of unsustainable behaviours are experienced by households and individuals in a direct way. Even in cases where students do not bear the costs directly, parents are likely to make efforts to make them aware of the costs. That is not the case with energy or mobility behaviours at work. Also, the existence of a local culture favouring the use of the car has been signalled by interviewees in Study 2, and this is also immediately visible on the University campus. However, the University could play a key role in changing this type of behaviour. Further research is needed into the causes of this result, as students are a critical mass at the University and their demands could act as an important motivator for change at the institutional level.

Testing the role of individual factors on pro-environmental behaviour in the workplace

As previous analyses have shown, students who act pro-environmentally in one domain do not necessarily do so in another. This raises the question of what determines behaviour in each of these behavioural domains, or even for each specific behaviour. As described before, a series of behavioural antecedents that have previously been identified as key determinants of pro-environmental behaviour in the literature were measured. Regression analyses were performed for each of the measured behaviours in order to check for the predictive power of values, efficacy, norms, worldviews, and identity factors. The most significant results are reported here.

Regression analyses were performed using all behavioural items for the three categories considered. For the categories of university-related mobility and energy use at the university, regression models were significant but explained a very low percentage of the variance of different behaviours (r square coefficients were around .10). As these models cannot be considered to add significant explanatory value to the question of what individual factors are important in promoting pro-environmental behaviour for students at the University, a decision was made to not present them here. Only models explaining at least 10 % of the variance in the dependent variable are presented below. It is noticeable that they all pertain to the domain of recycling behaviour.

Predicting recycling behaviour at the University

Regarding the dimension of waste management, regression analysis was again used to find out which factors better predict behaviours in this category. The following factors were again considered as predictors: a) 4 Value factors; b) 2 Efficacy factors; c) 5 Norm factors; and d) 3 Identity factors.

A number of waste management behaviours at work were considered as dependent variables, and a regression analysis was carried out independently for each of them.

Dependent variable: Using recycled paper at the University

For the frequency of recycled paper use at the University, environmental self-identity, descriptive norms and personal norms seem to play a role, although taken together these factors explain close to 11 % of the variance in the dependent variable, a very limited result (see Table 5.5.8). As these factors have such little explanatory power, caution should be applied in interpreting these results. It seems that other factors play a more important role even for recycling behaviours, which are among the most well-known and well established pro-environmental behaviours in the private realm, as it has been mentioned before. A t-test was run to see whether students do perform better waste management and recycling behaviours at home, and the test confirmed that indeed, recycling behaviour at home is significantly higher than recycling behaviour at the university ($p \leq .001$). This might be due to the barriers impeding adequate waste management behaviours at the University, which have been explored in the first two studies. It also might be due to a lack of perceiving responsibility for behaviour at the University.

Table 5.5.8 Frequency of recycled paper use at the University

Modelo	R	R cuadrado	R cuadrado corregida	Error típ. de la estimación	Estadísticos de cambio				
					Cambio en R cuadrado	Cambio en F	gl1	gl2	Sig. Cambio en F
1_E SI	,301[a]	,091	,088	1,820	,091	34,560	1	346	,000
2_D N	,325[b]	,106	,100	1,808	,015	5,734	1	345	,017

| 3_P N | ,342ᶜ | ,117 | ,109 | 1,799 | ,011 | 4,365 | 1 | 344 | ,037 |

a. Variables predictoras: (Constante), F2-Environmental Self-Identity

b. Variables predictoras: (Constante), F2-Environmental Self-Identity, F1-Descriptive Norms

c. Variables predictoras: (Constante), F2-Environmental Self-Identity, F1-Descriptive Norms, F3-Personal Norms

Dependent variable: Separating paper from other waste items at the University

A slightly higher variance of the behaviour of separating paper is explained by individual factors, namely environmental self-identity and environmental organizational identity (see table 5.5.9). Seeing oneself as a person who acts pro-environmentally and seeing the University as an institution who tries to act sustainably seem to play a role in this particular behaviour, although again the variance explained is relatively low, with the second dimension adding little predictive value to the model. As already analyzed in the case of workers, recycling behaviour is especially dependent on infrastructure such as the existence of adequate and visible recycling bins, which might contribute more to the explanation of this particular behaviour. A simple frequency analysis shows that 50 % of the sample does not recycle paper much, with the other 50 % providing answers on the positive end of the scale (5 to 7). Only 30 % declare that they always separate paper. Given that this is one of the less costly pro-environmental behaviours, for which a lot of education and governmental campaigns have been carried out, it paints a relatively negative picture of the level of pro-environmental behaviour among students. This is especially preoccupying as present generations of students have had environmental education introduced in their curricula, with efforts from the University to include it transversally in all disciplines at undergraduate level. Still, a promising avenue of intervention could be enhancing the perception that the

University is a pro-environmental organization, and making environmental self-identity salient in the different centers. Self-identity has also been suggested as one of the antecedents of pro-environmental behaviour that might support spillover between behaviours at home and other life and work contexts such as the University (Whitmarsh and O´Neill, 2010).

Table 5.5.9 How often do you separate paper from other waste items at the University?

Modelo	R	R cuadrado	R cuadrado corregida	Error típ. de la estimación	Estadísticos de cambio				
					Cambio en R cuadrado	Cambio en F	gl1	gl2	Sig. Cambio en F
1_ESI	,410[a]	,168	,166	2,183	,168	69,935	1	346	,000
2_EOI	,451[b]	,204	,199	2,139	,036	15,410	1	345	,000

a. Variables predictoras: (Constante), F2-Environmental Self-Identity

b. Variables predictoras: (Constante), F2-Environmental Self-Identity, F1-Environmental Organizational Identity

Dependent variable: separating plastic from other waste items at the University

The behaviour of separating plastic yields relatively similar results (see table 5.5.10). Only 20 % of the variance is explained by individual factors, with 15 % being contributed by biospheric values, and the other 5 % being explained by environmental self-identity and environmental organizational identity.

Table 5.5.10. How often do you separate plastic from other waste items at the University?

Modelo	R	R cuadrado	R cuadrado corregida	Error típ. de la estimación	Estadísticos de cambio				
					Cambio en R cuadrado	Cambio en F	gl1	gl2	Sig. Cambio en F

1_BV	,401[a]	,161	,158	2,201	,161	66,175	1	346	,000
2_ESI	,436[b]	,190	,185	2,166	,030	12,587	1	345	,000
3_EOI	,459[c]	,210	,204	2,141	,020	8,843	1	344	,003

a. Variables predictoras: (Constante), F1-Biospheric Values

b. Variables predictoras: (Constante), F1-Biospheric Values, F2-Environmental Self-Identity

c. Variables predictoras: (Constante), F1-Biospheric Values, F2-Environmental Self-Identity, F1-Environmental Organizational Identity

The role of exemplarity in pro-environmental behaviour at work: recycling and encouraging others to act

As in the case of staff, after exploring the role of different individual factors on the pro-environmental behaviour of students at the University, an attempt was made to explore the importance of the perception that one´s behaviour is exemplary, that it constitutes a reference for others (especially students, but also the wider society, as the academic status is often associated to being a role model), on both pro-environmental behaviour directly and on encouraging others to act pro-environmentally. In the case of students, two items were introduced to measure the exemplary role at the University: one referred to occupying positions of student representation (e.g. in student organizations or in the University´s decisional bodies) as these students tend to be known and more influential among others, and two answer options were provided (yes, no); however, I was also interested in processes of informal leadership among students and the influence they might have in promoting pro-environmental behaviour at the University. A second question was thus added that stated: "Do you consider yourself to be an influential person among your peers? In other words, do you

consider that others imitate your behaviour?", with a 7 point answer scale ranging from 1 (never) to 7 (always). A distribution of the sample for the two items is provided in tables 5.5.11 and 5.5.12):

Table 5.5.11. Distribution of the sample for the question: Do you act as a student representative?

		Frecuencia	Porcentaje	Porcentaje válido	Porcentaje acumulado
Válidos	Si	35	10,1	10,1	10,1
	No	313	89,9	89,9	100,0
	Total	348	100,0	100,0	

Table 5.5.12. Distribution of the sample for the question: Do you consider yourself to be an influential person among your peers? In other words, do you consider that others imitate your behaviour?

		Frecuencia	Porcentaje	Porcentaje válido	Porcentaje acumulado
Válidos	Nunca 1	38	10,9	11,0	11,0
	2	73	21,0	21,0	32,0
	3	74	21,3	21,3	53,3
	4	92	26,4	26,5	79,8
	5	54	15,5	15,6	95,4
	6	12	3,4	3,5	98,8
	Siempre 7	4	1,1	1,2	100,0
	Total	347	99,7	100,0	
Perdidos	Sistema	1	,3		
Total		348	100,0		

A simple correlation analysis was performed to see whether the degree to which one considers oneself to be a role model for others is related to pro-environmental behaviour at the University and to encouraging both peers and professors to act pro-environmentally on site. In terms of direct pro-environmental behaviour, only recycling behaviour yielded a positive, albeit low association with the perception of being influential (r square =.26, p≤.01). The associations with encouraging others to act pro-environmentally at the University arepositive for both peers and professors, with moderate Pearson coefficients however (r square =.34; and .33 respectively, at p≤.01).

Thus, those that perceive their role to be exemplary tend to recycle more at work, as well as to encourage others more often to behave pro-environmentally. Although associations are not very strong, informal leadership is known to be important among youth, and especially during University years, which are considered to be relevant formative years in terms of the systems of belief, identity and behaviours that will then define them as mature adults. Inquiring further into the relevance of informal leadership among students for the promotion of pro-environmental behaviour is thus relevant, but beyond the scope of this particular research.

Testing predictive models of pro-environmental behaviour at the University: the students´ case

The results of the regression analyses performed to determine significant predictors of pro-environmental behaviour at work indicated a few interesting results, with individual-level factors such as biospheric values, environmental self-identity, environmental organizational identity and, to a lower extent, norms, playing a role, albeit only for recycling behaviours did these results achieve a certain significance. Similar to the case of University staff, two predictive models of recycling behaviour were tested, as these factors are not independent of each other. The same line of argumentation is valid as for the workers´ case.

Although previous results are more supportive of the model based on classical theories of pro-environmental behaviour, a test was performed for the two models, as social influence processes are also likely to be important for students.

A Structural Equations Model Analysis was performed using Amos to test how the model fit the data. The model was only tested for recycling behaviour at work, as personal norms were

only correlated with this category of behaviours, but not to energy or mobility related behaviours. The full model can be seen in Figure 5.5.2. The Bentler-Bonnet fit index (CFI) and the root mean square error of approximation indicator (RMSEA) are reported, both considered to be important fit indicators for structural equations models (Byrne, 2010): CFI = .90, and RMSEA= .06. Both indicators are within accepted limits for good fit, and thus the model can be accepted as providing a moderately good fit to the data (Hu and Bentler, 1999).
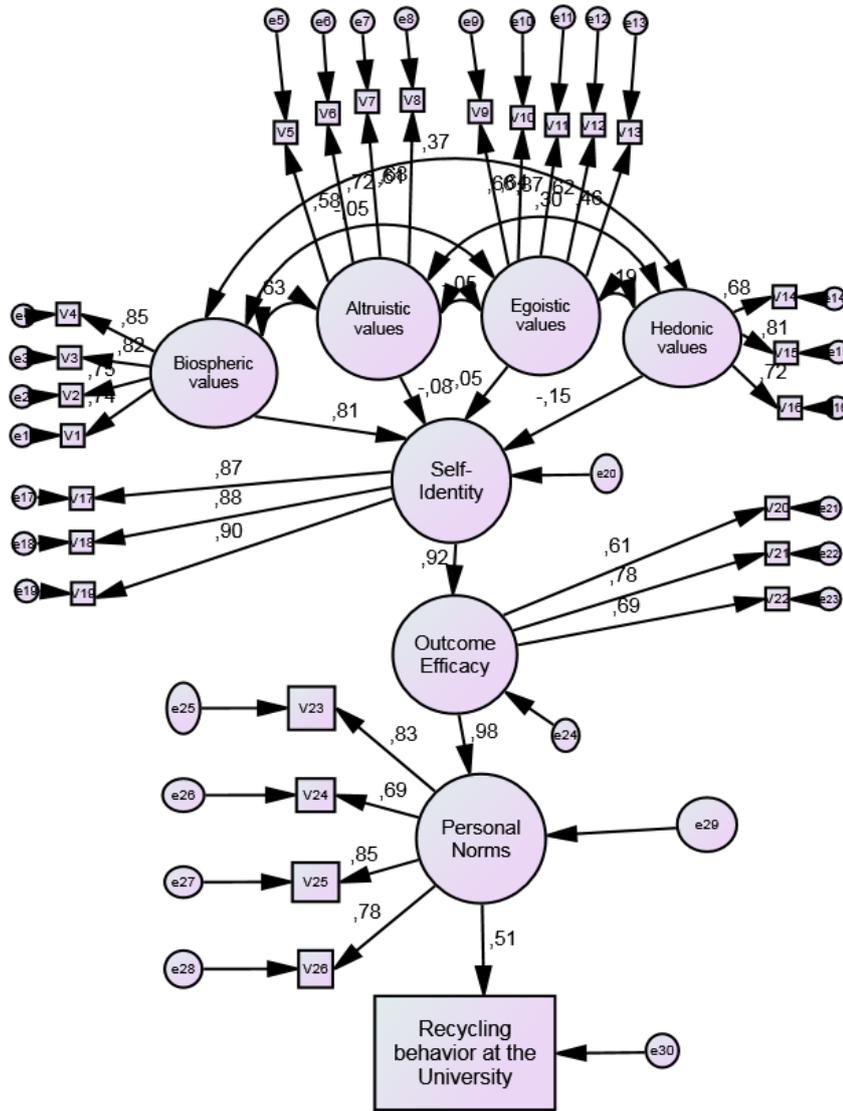
Figure 5.5.2 A path analysis model for explaining recycling behaviour of students at the University. *Numbers indicate Beta weights (standardized estimates), which refer to the relative importance of a predictor.*

This first model, although within acceptable limits of fit indicators, displays a CFI index in the lowest acceptable range. The second model was tested, emphasizing the role of social norms as predictors of pro-environmental behaviour at the University. Although formal educational contents have an important role to play in acquiring the necessary knowledge and attitudes to carry out pro-environmental behaviour (Zilahy and Huisingh, 2009; Zsoka et al., 2013; García-Valiñas *et al.,* 2010), it has been argued that universities can be influential in training people to perform important social roles effectively (Frank and Meyer, 2007) and social norms are likely to play an important part in this. Although no studies have been undertaken, to my knowledge, on the role of social and personal norms in students´ pro-environmental behaviours at the University, different authors have argued that social norms in general play an important role in pro-environmental behaviour in organizations (Ramus and Kilmer, 2007) and descriptive norms are especially important for voluntary po-environmental behaviour (Norton *et al.*, 2015). As mentioned before, descriptive norms are by definition models of what is possible and accepted as normal behaviour, and previous research has provided support for their relationship to the ability to perform a specific behaviour in organizations (Daily *et al.*, 2009; Lulfs and Hahn, 2013). As efficacy is defined as a person´s sense of competence to perform a specific behaviour given the appraisal of situational circumstances, a link was postulated between descriptive norms and outcome efficacy. In other words, seeing others perform pro-environmental behaviour will impact on a person´s sense of the possibility of personal contribution and will make this contribution be perceived as worthwhile. As in the previously tested model, it was considered that outcome efficacy

will activate personal norms, which in turn will influence recycling behaviour at work. The

full model can be seen in Figure 5.5.3.
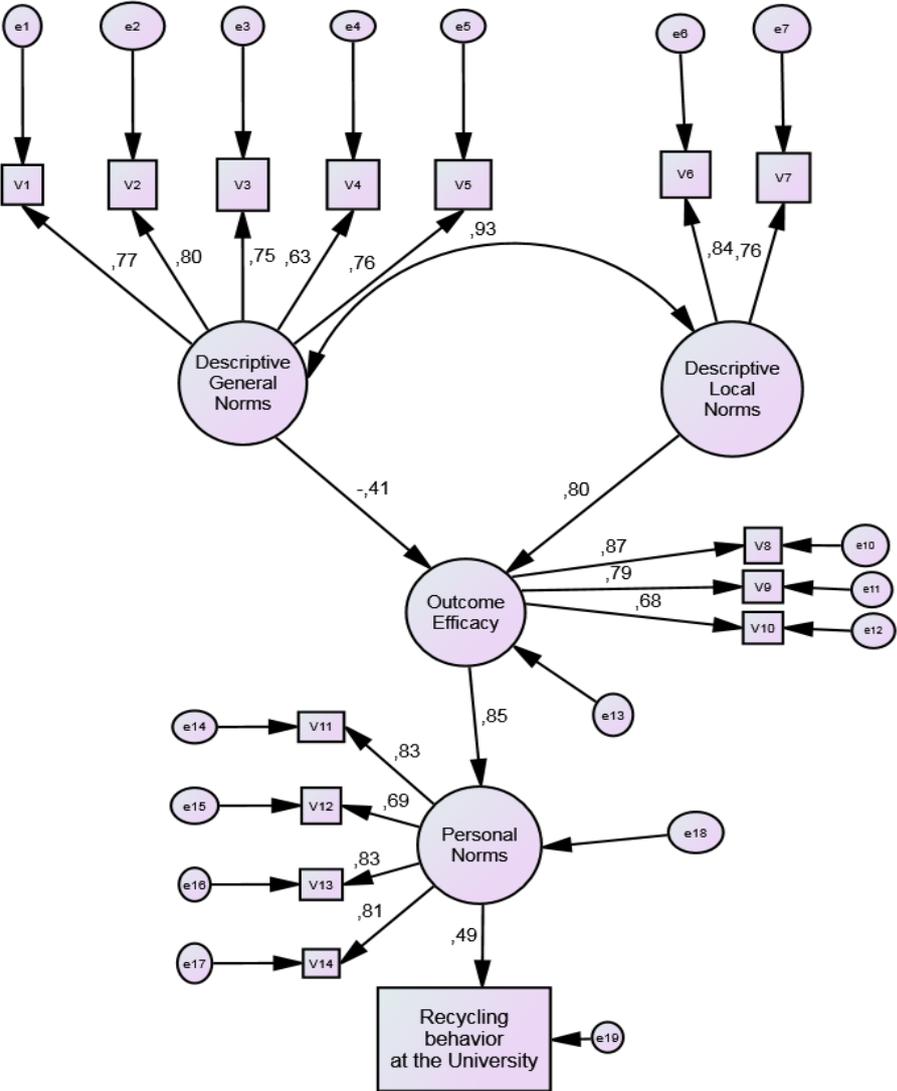
Figure 5.5.3 A social influence path analysis model for explaining recycling behaviour of students at the University. *Numbers indicate Beta weights (standardized estimates), which refer to the relative importance of a predictor.*

This model obtained better indicators of fit than the first one, with a CFI index of .93, and a root mean square error of approximation of .08. It can thus be concluded that this model provides a better fit to the data, with social influence factors playing a more important role in the recycling behaviour of students at the University.

5.6. Discussion

A series of confirmatory analyses verified the structure of the theoretical constructs measured. In general, these confirmed the proposed constructs, with less precision in the case of values and norms. An interesting difference was found between workers and students for these two constructs, with the structure being more problematic in the case of staff then in the case of students. Although the four-factor solution was verified for both samples, the composition of each factor was slightly different than theorized for the workers but was perfectly confirmed in the case of students. Further cluster and multidimensional scaling analyses suggested a more parsimonious structure for the values, which could be considered in further theorizing on values. In the case of the norm construct, the differentiation between descriptive, injunctive and personal norms was confirmed, but not between general and local norms, suggesting that individuals do not separate distal and context-specific referents for behaviour, but consider them together. Again, the norm structure for the staff sample was slightly more mixed than for the students´ sample. This raises an important issue, as most psychological research tends to be carried out with students and thus might not capture the variations in the

structure of values over the life span. More research into the structure of values at different ages might thus need to be carried out.

As seen in Studies 1 and 2, and corroborated by previous research, structural and organizational factors play an important role for pro-environmental behaviour in organizations (Etzion, 2007; Lulfs and Hahn, 2013; Tudor *et al.,* 2007, 2008). Existing researchhas focused on these only and has ignored the role that individual factors might have. These have started to be addressed in recent theoretical conceptualizations of voluntary pro-environmental behaviour at work (Lulfs and Hahn, 2013), in empirical research on energy, recycling and mobility behaviours at work (e.g. Scherbaum *et al.*, 2008; Tudor et al., 2008; Lo *et al.*, 2012a, 2013), and reflected in recent reviews of studies on pro-environmental behaviour in organizations (Lo *et al.*, 2012b). However, research on individual factors tends to be scarce, and research carried out in universities even more so (Sedlacek, 2013; Zsoka *et al.,* 2013; Scherbaum *et al.,* 2008), and the behaviour of students is mainly assessed in terms of the effects of knowledge they acquire through formal training processes and not in terms of their learning of performing social roles effectively (Franz and Meyer, 2007) and development of social influence processes that would influence pro-environmental behaviour in the context of universities.

Results of Study 3 provide insight into the antecedents of behaviours in the three areas. First, it is worth mentioning that in general, exploratory factor analyses have not provided a clear view of how these different behaviours are grouped by respondents, showing that they are experienced as different behaviours. In the case of workers, individual factors tend to play a higher role than in the case of students. This might suggest that staff might feel more

motivated to act pro-environmentally at the University and might experience more autonomy to do so, both directly, through control over certain energy-use behaviours for example, and indirectly, through participation and representation in internal governance structures that have decision-making power over certain areas of behaviour. Individual factors play a less important role for students, and most significant, although still modest, results were found for recycling behaviour, which is also the category of behaviour over which students have the highest level of objective personal control at the University. They generally do not have much control over energy use, and when that is the case (such as in turning off the lights when leaving a room), responsibility might become diffused or not perceived at all.

The three categories of behaviours have different individual antecedents in the workers´ case. Normative influences are very important, followed by identity factors to a lesser extent. These behaviours tend to be more influenced by social norms and organizational factors (such as the environmental organizational identity, which I have argued, could be considered a proxy for organizational climate), than by values, worldviews or self-identity. This result is coherent with previous research on mobility in the private realm (Bamberg and Schmidt, 2003; Hunnecke *et al.,* 2001) and with organizational research on determinants of sustainable mobility options adopted (Lo *et al.*, 2013). As mentioned in the introduction, mobility is the area that is responsible for the highest percentage of GHG emissions at the University, and thus understanding the factors that influence it is of extreme importance. The role of normative influences indicates a potential route for organizational interventions. Previous research has found that the displayed behaviour of organizational leaders (Norton *et al.*, 2014) and supervisory support (Ramus and Kilmer, 2007; Tudor *et al.*, 2008; Linnenluecke *et al.*,

2009) for pro-environmental behaviour are key influences on workers´ pro-environmental behaviour. Thus, if the University makes environmental objectives a part of its core values and organizational culture, members of staff with different leadership roles could adopt visible pro-environmental behaviour as a rule, in order to encourage this adoption among staff, and potentially among students as well. This would be particularly fitting in the case of mobility behaviours, as these are visible, high-cost behaviours, which would signal high commitment with environmental goals and would contribute to the perception of a pro-environmental organizational identity as well. However, results in Study 2 are not too encouraging in this respect, as members of leadership tend to consider mobility behaviours as politically costly.

Energy behaviours paint a less clear picture. Individual factors tend to play a lesser role for these, and elements of the organizational culture seem to provide the explanation for this result. Following the Competing Values Framework (Quinn, 1988; Linnenluecke and Griffiths, 2010), I have proposed a diagnosis of the university culture as favouring an internal process model for its organization and operation, with a preference for an internal rather than external focus, and stability and control rather than flexibility. This type of culture supports top-down policies that follow an efficiency rationale, and this is especially visible in the case of energy. The university has undertaken environmental policy in the area of energy, and has invested in renewable energy infrastructure. Although these policies have achieved good results in terms of GHG emissions reductions, they have been carried out without a good campaign for communication and dissemination, and without other behavioural change campaigns that would favour low-energy behaviours at the University. Also, there is a

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preference for centralized control over energy systems, and in most buildings staff does not have control over heating systems. The only behaviours over which they do have control are low effort behaviours such as turning lights on and off and even for those it seems that elements of the organizational culture play a role as barriers to pro-environmental behaviour.

 Recycling behaviours are the only category of behaviours for both staff and students where biospheric and altruistic values exert a direct influence. Self-identity, together with both descriptive and injunctive norms seems to complete the picture in the workers´ case. It thus seems that values play a role for low-cost behaviours, as it has been previously argued (Steg *et al.,* 2014), when these are freely chosen and when behaviours are encouraged by the organization. Organizational support is even more visible in the case of students, for which environmental self-identity and environmental organizational identity are the factors with most influence over this type of behaviours.

Besides being a workplace and a public organization, the university enjoys a particular social status which endows it with respect and makes it a reference for the wider community. Due to their main education and research functions, staff tends to be aware of the fact that their behaviour influences others in important ways. To account for this important aspect, I inquired into perceptions of having an exemplary role among both workers and students and results showed that this variable influences both direct behaviour at the university (e.g. recycling behaviour) and indirect behaviour (e.g. encouraging others to act pro-environmentally). Furthermore, for those having the perception of an exemplary role, it was found that personal and social norms are important determinants of their pro-environmental behaviour at work. This might mean that a focus on the self as having an exemplary role

might make personal norms more salient in situations in which behaviour can be followed by others, such as at the University, where academic staff is exposed to the scrutiny of both peers and students. Said otherwise, having an exemplary role might bring into awareness feelings of moral responsibility, which might in turn influence what is perceived as exemplary and appropriate behaviour. This hypothesis deserves further exploration in future research, as it is a very interesting avenue for organizational interventions to promote pro-environmental behaviour at the University and to create ´virtuous´ loops of social influence that would also contribute to the creation of a pro-environmental culture. This is also the case for the students investigated, and much less is known in the literature about the role of social influence processes on pro-environmental behaviour at the University. However, research regarding other types of behaviour in the domains of health or substance abuse has pointed to the important influence of normative dimensions in young populations. Our results point to the fact that there might be a positive relationship between the perception of having an exemplary role among peers and both direct and indirect behaviour. Further research on these processes would be necessary and worthwhile.

Study 3 went beyond the identification of individual antecedents of different pro-environmental behaviours, to test two integrated models of pro-environmental behaviour at the University, for both workers and students. A review of the literature highlighted the fact that a few integrative models of pro-environmental behaviour at work have been proposed but empirical research in this area is still at its beginnings. Traditional theories of pro-environmental behaviour in the household have been hard to translate to organizational contexts, due to the different conditions placing constraints on behaviour and generating

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different patterns of both deterrents and incentives for pro-environmental behaviour at the University. It has also been argued that no definitive conclusion has been reached attesting to the superiority of one theory over another (Lo *et al.*, 2013), and recent meta-analytic reviews of studies indicate that models that integrate elements from different classical theories (Bamberg and Moser, 2007; Turaga *et al.*, 2010), and include dimensions that have recently been found to play an important role such as environmental self-identity (Whittmarsh and O´Neill, 2010; Van der Werff *et al.*, 2013), and efficacy (Tabernero and Hernandez, 2011) are likely to provide better explanations for the study of pro-environmental behaviour. Furthermore, studies carried out in the workplace have suggested that individual perceptions of the organizational context also play a role, such as the perceptions of whether the organization is committed with sustainable values and practices, as well as the perceptions of others´ behaviours and expectations, especially leaders (Norton *et al.*, 2014).

Two different models of pro-environmental behaviour for both workers and students were thus tested, one based on an integration of factors postulated by traditional theories, but modified to include dimensions that were found to be important for pro-environmental behaviour, and the other exploring a normative pathway to pro-environmental behaviour, with descriptive norms influencing outcome efficacy, which in turn activates feelings of moral obligation to act pro-environmentally, which are the direct predictor of behaviour. I tested these models for both university groups and found more support for the normative influence models in both cases. These latter models postulate new mechanisms through which pro-environmental behaviour might be supported in organizations in general, and universities in particular. It has previously been argued that observing the behaviour of others, and especially

leaders (Norton *et al.*, 2014), leads to voluntary pro-environmental behaviour. In this study, potential mechanisms through which this might happen were tested. Descriptive norms, both general and local, contribute to an increased sense of outcome efficacy, as they provide models for acquiring new behaviours and might also contribute to a perception that everyone is doing their part, which might enhance the feeling that one´ own contribution is worthwhile (Strauss *et al.*, 2009). The fact that the impact of pro-environmental behaviour is dependent on others also contributing their share indicates that making others´ behaviour visible is important in generating perceptions of outcome efficacy. The perception that others act pro-environmentally, together with a sense of outcome efficacy, activates feelings of moral obligation to act pro-environmentally, which are direct predictors of recycling behaviour at the University.

On the basis of results obtained in Study 3, it can be concluded that classical theories of pro-environmental behaviour developed for other life domains are less suited for organizational behaviour, where organizational factors, role tensions and contradictions, and hierarchical and horizontal relationships act as influences on individual behaviour. Integrated models that consider how structural and organizational factors interact with individual values, motivations and identities in either supporting or hindering pro-environmental behaviour should be further developed and tested. Also, processes of social influence play a key role in the promotion of pro-environmental behavior at the University both as a workplace and as a learning environment. I was able to show one potential route through which descriptive norms might lead to pro-environmental behavior at the University for both students and staff, which add to the conclusions of Studies 1 and 2, showing that different organizational factors interact to

generate a context in which such descriptive norms might either support or hinder pro-environmental behavior.

6. Study 4: Creating participatory scenarios for the future at the University

6.1. Introduction

After obtaining a complex picture of the barriers and drivers to sustainable practices in the university, a participatory intervention was designed, to create a set of dynamic and normative perspectives on the future of each organization in 2050, through a participatory and inclusive approach, and thus construct knowledge on the necessary steps of transitioning to a more sustainable organizational end-state. The question formulated for this study was:

> *Q8. How can a process be set up that promotes both participation and commitment to environmental policy?*

The answer this question, a participatory process was promoted that involved workers in the formulation of workplace environmental policy and reveal preferences regarding future characteristics of the organizational environment (M.S.5).

Concerns about workplace well-being have emphasized autonomy as one important contributory factor (Moreau and Mageau 2012; Trépanier et al. 2013), which has also been proposed as a fundamental human need (Deci and Ryan 2000). Participatory bodies are an integral part of decision-making processes in an organization such as the case study university, and thus there is considerable room for the sustainable initiatives of workers to be taken up by management if these are perceived as having worker support. These initiatives could then be translated by management into specific measures and policies for sustainable

everyday practices in the areas of energy consumption, waste generation and management, and work-related mobility. However, in Study 2 it was found that, in spite of such high levels of autonomy and the existence of a wealth of effective suggestions to promote pro-environmental everyday practices by workers, the management of the university perceived that there was a low level of demand for pro-environmental options to be made available (e.g., in products in cafeterias, etc.). Middle-level decision-makers in each university unit complained about the lack of spaces and contexts in which to share experience with other colleagues confronting the same issues, in order to come up with creative solutions to problems that have an environmental sustainability dimension. Thus, it can be seen how, even in organizations with a high degree of worker autonomy, contexts of peer-exchange are not necessarily present, nor are there contexts where innovative solutions can be found.

Involving workers in transforming organizations should go beyond solving everyday problems to encouraging strategic sustainability initiatives for which spaces are made available for their development, testing and implementation. Such contexts are likely to produce consensus about the final goals and outcomes of organizational change as well as successful pathways for transformation in organizations. In order to explore the potential for worker participation in the design of sustainable future visions and solutions for the organization, Study 4 uses a methodology of back-casting scenario development to obtain a worker-led perspective of what transition to a sustainable organization with a significantly lower level of CO_2 emissions would mean. An important novelty of this intervention is the fact that it has used back-casting scenarios with organizational stakeholders in order to envision future sustainable visions of the organization within a sustainable regional and

European context. This is scarce in back-casting research, and most studies have been developed around future visions of a region or a city, in order to help policy-making for local, regional or national governments. Almost no studies have been done with the aim of supporting transformation and sustainable changes in private and public organizations.

6.2. Characteristics of the back-casting methodology

Back-casting scenarios constitute a relatively new methodology in the field of sustainability and climate change. Despite its appearance and theorization in the decade of the ´70s, it is only recently that it has become widely used as an instrument in helping decision-making processes in policy-making. The back-casting scenarios methodology appeared in response to the discontent with the traditional methods of trend extrapolation in energy forecasting, where it was assumed that energy demand would increase gradually and renewable energy technologies and energy conservation efforts were ignored (Vergragt and Quist, 2011).

In future and sustainability studies, back-casting scenarios are defined as a methodology that allows us to envision and analyze different types of sustainable futures and develop agendas, strategies and pathways to reach them (Vergragt and Quist, 2011). It has a strong normative component, as it starts from desirable future states or set of objectives and then analyses the steps and policies that are needed to get there, in order to be able to design agendas that can be implemented and that normally require cooperation and communication among different types of actors in complex socio-economic and political environments. It is considered a useful tool in going toward alternative futures in issues of climate change (Giddens, 2009).

Scenarios have been grouped in three different classes (Borjeson et al., 2006; Dunn, 1994). Some deal with what will happen and they have also been called "business as usual scenarios" because they are based on actual trend extrapolation, and are also called first-generation scenarios. They look at the general trends in policies and markets in a given domain of life (e.g.: energy use) and they assume things will go in the same direction with no major changes or disruptions. They are sometimes used as reference scenarios, to illustrate the consequences of present policy in the future and the discrepancy between the set objectives and what would actually happen if trends in society follow the same direction. They are also used as a basis for comparison between the consequences of the present state of affairs and the normative goals set for the future in the domain of sustainability.

The second class of scenarios, also called second-generation scenarios, deal with what could happen and this class includes all types of forecasting exercises, fore sighting and strategic scenarios. This type of scenario stimulates creative thinking about unpredictable changes and disruptions in the natural, socio-economic and political environments and explores the consequences of any such event and the types of measures and structures required to be able to adapt to these new states of affairs. They were widely used by Shell in the ´70s (Wack, 1985) and they yielded some good results, but also showed they were limited in predicting what is essentially unpredictable. This methodology is used in the present by the IPCC, which has modelled what could happen to the climate as a consequence of GHG emissions in the atmosphere. Firms use it in order to prepare for all kinds of changes, but, as it is easily visible, they can only be designed for those types of changes that can at least be imagined.

Finally, the third class of scenarios deal with what should happen and this is where back-casting scenarios fit in. They have appeared within the context of sustainability and climate change challenges because they seem to perform better in taking into account the systemic nature and the high uncertainty associated with the environmental problems we are now facing. Generally, they also assume that systemic changes in society are needed in order to reach the normative objectives established. Also called third-generation scenarios, they have characteristics that make them especially suitable for facilitating transitions to sustainability: they constitute a systemic approach; they are comprehensive and rely on participation of relevant stakeholders; they acknowledge uncertainty as a key characteristic of the analysis of the future and of complexity; and they establish a normative stance in the mapping of the future.

A literature review on back-casting scenarios shows a few important on-going debates on the methodology, which have informed decisions taken in this case study on how to structure the back-casting scenarios development workshops. The first important debate refers to what should be given more attention in scenario development. Target-oriented scenarios (Höjer et al., 2011) centre more on the development of several endpoints or images of the future states, and more space and time is allocated to this than to the actual definition of measures and strategic pathways to get there. Process-oriented scenarios (Robinson, 1990) are more centred on the ways to structure the process of the creation of scenarios, in order to ensure effective participation of stakeholders and to produce, besides images of desired end-states, possible pathways to reach them and specific agendas for their implementation. One study investigating whether solutions and policy measures proposed in the back-casting scenarios

have any impact 5 and 10 years after their proposal showed that the area of implementation is not well covered and that more research is needed in order to ensure that measures are put into practice and that adequate monitoring strategies are also developed (Quist et al., 2011).

Organizations have an important role in making the necessary changes and in implementing the measures needed to achieve a reduction of GHG emissions. Structuring a good process is likely to ensure higher-order learning (Quist *et al.*, 2011; Brown andVergragt, 2008) for both the researchers and members of the organization and will also provide the conditions for more involvement with low-carbon objectives, thus contributing to the incentives for promoting measures or performing the systemic changes necessary in the transition to more sustainable organizations.

Another important debate in the domain of back-casting for sustainability centres on the question of who should develop the future vision. Some argue that future visions should be created by experts, while others are strong supporters of involving stakeholders in defining both the future visions and the strategic measures needed to get there (Robinson, 1990; Robinson *et al.*, 2011), as it creates learning, a stronger attachment to the goals, and a stronger feeling of empowerment. In this research, it seemed rather obvious that it is necessary to involve stakeholders in the creation of the vision, as well as in the definition if the complex pathways to make it possible, as participation in the establishment of goals is fundamental in personal identification with those goals and thus an important determinant of the willingness to put it into practice. Also organizational stakeholders hold relevant knowledge on the constraints their organization will face in the future and the conditions under which it is likely to have to operate.

6.3. Description of the back-casting methodology used

In developing the back-casting scenarios, a combined approach was used: on the one hand, a methodology of focus groups to develop the scenarios, inspired in part by the one used by Svenfelt et al. (2011) in their study on decreasing energy use in buildings but significantly adapted to fit the objectives of the present study was used; and the stepwise approach of Kasper Kok et al. (2011), to orient the process and help stakeholders in getting disengaged with the present, and being able to create truly innovative visions of the future, one of the hardest aspects of back-casting scenarios both with stakeholders and experts (Svenfelt *et al.*, 2011).

Two workshops were conducted. The first dealt with vision development and focused on developing a set of images of sustainable futures for the organization. The second focused on defining the strategic pathways to reach them and the social actors that should be involved.

Developing visions of the future: *Stakeholder analysis*

In order to ensure a good process, the number of participants in the first scenario development workshop was maintained between 8 and12 members of the organization. For the scenarios to be useful and to have the potential of being translated into effective measures within the organization, a careful stakeholder analysis was performed. The aims were to ensure the presence of members of the organization who have detailed knowledge of the organization, its

present policy trends, and of the forecasts on relevant expected or possible changes in the wider policy environments; and also to have people in management positions involved, as they have the highest potential to make change happen. Also, based on information from previous stages of the research, care was put into ensuring that the participants did not have significant conflicts among themselves that would have potentially undermined the participatory dynamic intended.

A final group of 12 people was invited, belonging to different academic departments and whose work had an environmental aspect to it. They thus played the double role of university staff and experts, contributing to the creation of creative visions of the future.

Preparation of the visioning workshops

It was decided that participants should receive brief information on the method and what was expected from them, in order to diminish the potential anxiety that might arise. Also, they were announced in advance that this is a participatory methodology and that their opinions and imaginative ideas were of interest, and not so much on their exact knowledge about future trends.

The participants were invited in an informal environment away from the organization, in order to facilitate perspective-taking and diminish constraints on the free expression of ideas. A recent study has shown that different social settings have a different impact on scenario development, with "warm settings" yielding better results (Robinson, 2011).

Problem definition and establishment of targets

After a brief presentation of the method and its objectives, this first step involved defining the problem, analyzing what the target specifically comprises in the three relevant areas of study (consumption of energy and resources; waste management; organization-related mobility), and what the system boundaries are.

The projection year was 2050, and this was chosen for several reasons: first, it is the projection year most commonly used in the European Commission policy documents as it is relatively easy to envision (the generation when our grandchildren will be our age) and also far enough away as to allow for radical change to happen (Vergragt and Quist, 2011). It is also the target year used by several organizations like the IPCC to forecast climate change effects if a "business as usual" policymaking strategy is followed.

According to the Greenhouse Reduction Pathways study, performed for the Directorate General - Environment of the European Commission with a set of European models, the necessary reduction in GHG emissions in OECD countries needs to be between 50 and 80% of their 1990 levels to ensure that temperature at the earth surface does not increase beyond 2 degrees Celsius compared to pre-industrial levels, as it is considered that a larger increase in temperature would create disastrous consequences for humanity. Targets for emissions reduction are calculated depending on the varying responsibility for GHG emissions and balancing it with the social and economic cost of abatement (WETO-H2 Report, European Commission). Thus, industrialized, EU-25 countries have to achieve higher reductions by 2050 than developing countries. Each country has established a different schedule for reductions but most EU countries follow the same target, which supposes a reduction of an

average of 50 % GHG reduction compared to 1990 levels. Overall, it was considered that in 2050, the EU countries will have achieved on average a reduction of 50 % of GHG emissions compared to 1990 levels.

Participants were asked to start thinking about what the targets for the University should be for 2050, in order to function successfully. After a first debate about the general desired targets for their organization within that environment and the translation of these in perceptual GHG emissions reduction, participants were encouraged to think about more specific targets in the following three relevant categories of practices:

- Consumption of materials and energy, in both the production process and their everyday organizational functioning

- Waste management

- Organization-related mobility

The result of this first step consisted in defining specific organizational targets to be achieved in 2050, with a specific GHG reduction level. This phase also contributed to diminishing the arising anxiety in some of the cases, related to the novelty of the method and to the requirement to speak freely in front of sometimes unfamiliar colleagues.

Brainstorming

The objective of this second step was to allow for the free production of ideas around the theme of "Our sustainable organization in 2050". Depending on the characteristics of each

organization and group, participants were sometimes divided in two or more smaller groups to encourage active participation.

Development of future images

This step involved the development of narrative images of target-fulfilling futures, or, in other terms, a story about the final desired state of the organization in 2050. In order to produce these images, the ideas produced through brainstorming were first grouped in several categories of types of changes: cultural, technological, social, economic and structural. A second round of discussions among participants was facilitated at this phase, in order for the group to extend these categories and make them more comprehensive. The most important factors likely to affect target achievement were signalled. These elements were then used to develop a narrative describing the future organization in 2050 if targets are to be achieved. The emphasis here was placed on providing qualitative and graphic illustrations of what the organization might be like if the targets are achieved.

Development of the back-casting workshop

This workshop had as its objective to discuss the images produced in the first one and work backwards to establish the phases and milestones of the transition to the future end-state. Also, participants were instructed to discuss the relevant social actors that should be involved and describe their level of involvement, action and responsibility. In this part, there were also discussions on the obstacles and opportunities that already exist or are likely to appear in the

process of decision-making and of a concrete agenda of action. Table 6.3.1 presents a list of the issues to be discussed.

Table 6.3.1. Guidelines for the back-casting exercise

1. Some general reflections about the images of the future produced in the previous step.
2. Which measures need to be taken in order to arrive at the images described?
   - What areas should constitute a priority in order to arrive at the images described?
   - Among the three areas under discussion (consumption of materials and energy; waste; organization-related mobility), which do you think is the most important to be tackled in your organization, in order to achieve the set targets, and why?
   - Identify milestones and interim objectives for each of the images. What measures should be adopted for each milestone to be reached?
3. Which actors need to take action in order to make change happen?
   - Identify the actors and the types of responsibilities they would have to assume to make change happen.
   - What type of cooperation and mechanisms for streamlining would be necessary to ensure that targets are reached?
   - What potential obstacles and opportunities can you identify in this joint action and what could be done to avoid or, respectively, make the best use of them?
4. How and by whom can these actors in their turn be incentivized to take action?
   - What kind of incentives could be designed in order for the actors to be motivated to take action?
   - What kind of changes are necessary for those incentives to be put in place and made to work?
5. General reflections on the proposed measures
   - Do these measures seem sufficient to you?
   - Do they require radical and systemic change?
   - What could be done to incentivize organizational future leaders to follow a long-term strategy to reach the targets?

6.4. Results

The visioning workshop

The University of A Coruna produced three different scenarios for 2050, each becoming more ambitious in the targets they set and the change they suppose. The scenarios are described as narrative accounts of the University in 2050 and a brief overview of them can be found in Table 6.4.1.

A conservative scenario for the University in 2050

The University of Corunna stays in the same place (several campuses) and uses the same infrastructure, although improved and optimized. This vision assumes the necessity of both technological and human changes that would lead to emissions reductions.

The University will have more flexible infrastructures, organized functionally. The buildings have better insulation systems and exterior spaces are adequately maintained. Each building is self sufficient in terms of energy, having own energy generation system based on renewable sources. In each building, measures for energy efficiency have been implemented, such as interconnected temperature detection sensors based on number of people and movement across spaces. The schedules of university staff have changed and have adapted to the seasons and the corresponding exterior temperature.

The University is self-sufficient and consumes own products. The food consumed in cafeterias on campus is ecologically produced, and respond also to educational objectives (as they are practical activities for different degrees. The menus in cafeterias respect health and educational criteria, are vegetarian, are based on local consumption (when the university´s production is not sufficient, cafeterias buy from local producers who are certified as ecological across their production chain). Prices are just, including the environmental cost of products. The University has fewer cafeterias and promotes return recycling. Furthermore, each building has its own recycling center and reaches an objective of 0 waste, by generating sub-products. Green contracting is implemented at all university levels and the cost of products is generally calculated by including ecological parameters.

Paper does not exist in the University anymore. Water provision is self-sufficient.

The majority of both staff and students use public transportation and bicycles to reach the university. As most students live in student residences they can walk to and from the university. Car use is only common for a minority and is not well seen at the University.

A de-growth and de-localized model of the University

The University has been moved to the city and the different communities around it with small and multi-functional rooms in each neighborhood, as support for virtual teaching. This vision assumes a mixed model of education which involves some important technological changes.

The University is represented by these rooms which have state of the art technology for online teaching, as well as individual and group study rooms. The buildings in which these rooms are hosted are completely adapted to their environment (through passive architecture) and their level of emissions is almost 0. These rooms can be used 24/7 hours a week, and possess efficient energy systems which are adapted so as to ensure the minimum consumption possible. All the rooms possess systems of energy self-generation, sensors to detect temperature and adapt it to the numbers of users at any moment.

As in the previous scenario, each room has its own recycling center, and transforms waste into sub-products. Return recycling is also promoted and dangerous materials are adequately processed. Green contracting is implemented at all university levels and the cost of products is generally calculated by including ecological parameters. Each room has its own small cafeteria, which serves vegetarian menus, with local products and at just prices.

Paper does not exist in the University anymore. Water provision is self-sufficient.

The majority of both staff and students use public transportation and bicycles to reach the university. Many walk to and from the university. Car use is only common for a minority and is not well seen at the University.

A virtual and centralized University model

The University as an autonomous institution does not exist anymore. All teaching is done online at different European universities, using advanced technology. This vision assumes important technological and human changes related to this new form of learning and interacting.

It also assumes important political and social changes in a sustainable direction. Universities are few; they teach in one language only and have very good teaching systems, with a competitive international profile.

Each person can learn across the whole life-span and from home. Technology is accessible to everybody and implies access to full interaction from home, through the use of holograms, video and e-conferences. Research is undertaken in European labouratories coordinated through the entire European Union. These new technologies are also allowing interaction to feel real, as all sensations are reproduced very closely to those experienced in direct contact.

Local policies have contributed to reducing the waste to 0, as recycling centers are easily accessible, sub-products are generated and return recycling is part of the culture of all institutions and services. The number of vegans and vegetarians is bigger, and the prices of any product or service reflect the environmental costs they incur in.

Education-related mobility is reduced to 0. For health promotion, technology for exercising at home is available, such as desks adapted to include running tracks.

Table 6.4.1. Brief summary of the scenarios produced by university members

Conservative scenario	De-growth and de-localization	Virtual and centralized
The University stays in the same place with the same infrastructures.	The University moves to the city through small, multi-functional room, as support for virtual teaching	There are a few European universities that use virtual teaching through the use of state-of-the-art technology. Students learn at home.
Involves a moderate degree of human and technological change	This model assumes a mixed model of education with important technological change.	Mostly technological changes are necessary – radical. Human changes refer to the need to adapt to new forms of interacting and learning.

The back-casting workshop

The second workshop started with an analysis of the scenarios produced in the first workshop and participants were encouraged to collectively decide for which scenarios they wanted to develop back-casting pathways, in order for them to have the control over the process. The decision was made to work on the first and third scenarios.

First Scenario

The first scenario developed for in the visioning workshop was a conservative scenario, in the sense that targets went in the same direction as already existing in the European Union and also in the member countries, including Spain. The first part of the discussion focused around refining the target goals for this scenario, on the basis of the previous workshop and also on

estimate emissions reductions calculated by a research colleague with expertise in such estimations.

As mobility accounts for approximately 50% of all University emissions, a lot of the discussion focused on establishing targets for work-related mobility. A reduction of car use to 20% of university staff and students was considered worthwhile and feasible for 2050. Within this scenario, 80 % of the university population would use more sustainable means of transportation: 20% would come on foot; 30 % would use bicycles, and another 30 % would use public transportation such as train or bus.

In terms of waste, targets focused mostly on the reduction of paper and water. For paper, a reduction of 80 % of the actual use is intended, while the rest should be recycled paper only. For water, the target is of 0 waste, or complete re-use of all water. "Superfluous" or "choice" plastic such as water bottles would be reduced drastically as well and plastic used in machinery and other necessary devices would be recycled. A target of 30% of meals being vegetarian was established. In terms of energy, a reduction of 30 % was established.

2012-2020

By 2020, public transportation would probably not be drastically improved, due to shortage of public funds and public expenditure, as a result of the economic crisis. Due to this fact, it is likely that mobility emissions would not be reduced drastically, although the plans for a student residence exist and will start building in a few years. Also, the existing plans for bicycle use on campus and increased use of bicycles in Corunna due to a public rental scheme

put in place by the local government will likely reduce car use, albeit by a narrow margin. Plans for car sharing will be put in place by then.

Paper will still be used by 2020 at a similar rate to that which is common now, but recycled paper will be supplied as an option and will be purchased by approximately half of the staff on a regular basis. Existing levels of water waste will not be significantly reduced as they depend on investments for changes in existing systems. Options for purchasing glass water bottles and return recycling of glass from machines and cafeterias on campus will be provided and educational and awareness campaigns stimulating the use and return of glass bottles will achieve a 20 % reduction in the use of plastic bottles. This will also be a consequence of the larger use of water fountains present on campus, as a result of a better signaling and information system which would allow people on campus to know where they are located.

2020-2030

As the economy will start to recover by 2020, and recovery will come from higher investments in research, innovation and technology, it is likely that between these years public transportation will improve. This will be done through a collaboration of local, regional and university planners, which will include a system of on-ground metro or train, which will connect the city with its campuses, as well as with surrounding communities. Coupled with making transportation very cheap and awareness-raising campaigns, around 40 % of present-day users of private cars will start using public transportation. Also the number of online-only scientific events and webinars will increase, contributing to a reduction of 30 % in work-related mobility, including airplane travel, with the consequent reduction in GHG emissions.

By 2030, the university will have a very convenient car-sharing scheme for those still using the car, and the University will have acquired a few electric vehicles, which will be used for car-sharing when going to scientific or academic events for which other form of public transport is not available. The University will have a very easy-to-use online system that would facilitate car sharing and will use incentives such as a system of acquiring points which can then be exchanged for free entrances to cultural events in the city. Also, the university´s main campus will reduce the available parking space by half by 2030, by building the campus center (a social networking and studying space previewed in the university plans), and other green areas facilitating social sharing. These measures will make the campus the center of the social life of university staff and students, thus reducing needs for mobility to other places.

Paper consumption will be reduced by 50 % of present use, as higher investments will make possible the changing in formal university procedures to electronic ones (by acquiring the necessary technology). Other efficiency measures will be implemented for energy use, such as presence-detecting lights in all buildings, better insulation where necessary, and possibly infrastructure changes in some of the buildings, including the change in main sources of energy to renewable ones and installing differential control over temperature settings. Feedback systems will be put in place, allowing individual workers, departments and entire buildings to monitor their energy reductions and the significance it has on GHG emissions reduction. Warnings will be sent if a certain level of energy use is passed, thus allowing the person to adjust her use.

Some investments in system changes for the mitigation of water waste will be made. Also, systems for water re-use will be installed in 40 % of the buildings. The use of plastic bottles

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will further achieve another 30 % reduction, reaching a total of 50 % reduction of the present use. This will be due to awareness-raising, but also to restrictions imposed on providers (as part of green contracting) to campus cafeterias on plastic use.

2030-2050

As public transportation systems are increasingly becoming more efficient, and there is a generational change with today´s youth coming into adult age (assuming that their environmental awareness and practice with sustainable practices are higher), acquisitions of private cars will stop being something desirable, and thus a reduction of private car use to move between home and the university of 80 % of present day users will be achieved. At the same time, besides considerable improvements in public transportation, in terms of frequency, commodity and price, the government, as a result of hybrid and electric vehicles becoming cheaper, starts making some investments in public transportation that is hybrid or electric, thus further reducing GHG emissions related to mobility. Private car users are also increasingly buying "greener" vehicles. Also, due to a re-appreciation of family and community life, measures for working from home are implemented, reaching a reduction of transport needs by a significant amount. Also, as online classes will become more widespread, students will also reduce their need for travelling.

Further acceptance of online-only events will make these more popular among academics, together with the wider investments in technologies that make this possible. Up to 50 % of scientific and academic events will be online-only.

Paper will disappear progressively from use. Only electronic procedures will be used. In terms of energy use, feedback will become more instant with the use of energy-detecting bulbs that turn red when a certain level of energy has been reached. These will be implemented both at the university but also in people´s homes (in the sense of their use becoming more common and desirable), and thus practices of reduced energy consumption will become habitual. The university will be completely self-sufficient in terms of energy by 2050. Progressively, the university will set higher reduction targets for energy among its staff and introduce more efficient technology, and progressive investments in renewable sources of energy.

In terms of water re-use, a target of 100 % re-use will be reached by 2050, with the progressive change in water provision and recycling systems across all university buildings. Plastic bottles use will be reduced to 0, with progressive restrictions on providers, awareness campaigns, and the widespread use of water fountains and glass bottles. Waste recycling will be further improved promoting intense return policies and collabouration schemes among responsible staff. As the vegetarian menus will progressively become more varied and health concerns (especially related to obesity) will become more salient, up to 30 % of the meals of every person will become vegetarian. Compost will be produced from the organic waste of the entire campus

Responsible actors: UDC mainly, but also local and regional government.

Third scenario

The third scenario developed was a more radical one, assuming a model of entirely virtual and more centralized university. Targets for emissions reductions were more radical than in the

first scenario. Work-related mobility would be reduced to 0, as the university as a physical institution would not exist anymore. More generally, private car use would be reduced as cities would become more compact and local community life would be enhanced.

In terms of waste generation, discussion in the group did not focus on targets for this, as the idea was to establish reducing targets for the university. As the online university would mostly generate electronic waste, the targets focused around improving recycling of electronics, re-use of materials from computers and other machinery and establishing some wider goals for the reduction of waste at the level of community and personal homes. Same was true for paper, water, energy use and reducing consumption of meat.

This scenario requires a gradual transition to very different forms of interaction, as well as teaching and learning. Participants thought that this transition needs to be done gradually, through sensitive policies which would ensure acceptability of these new forms of learning and interacting. They also thought that some of the trends present in this scenario are driven by technology and somewhat unavoidable. This implies that the function of policy becomes one of mitigating or correcting for some of the negative effects these trends might provoke, as well as of taking advantage of these trends in order to advance action on objectives such as the mitigation of climate change.

The first part of this gradual transition refers to measures to make technology cheaper and to put in place mechanisms that would provide sufficient funds for the necessary technology. These could include borrowing schemes, possibilities for renting at low prices or a system of donations to lower-income persons. It would also involve that the virtual universities would implement all the necessary technology and train and involve faculty in these new forms of

teaching and interacting. Participants considered that their training is key in ensuring adequate coordination among them and with students. The group also raised an important concern which needs to be addressed if this future scenario were to be used as a roadmap, which is the expected loss in direct human contact and the effects that might derive from this, such as increased rates of depression, less quality of training for a profession, or the loss of personal and professional enrichment and development that come through contact. To address this concern, they proposed to create the possibilities of attending classes a-synchronically (through the recording of classes and lectures) without completely eliminating human contact, by using visual materials.

This scenario thus involves several stages of implementing these new technologies and allowing people time to adapt to this new reality, by introducing it progressively. Also, in the initial stages, this scenario involves a lot of training for teaching staff in order to increase technological knowledge. This training should be considered a priority by the governments and direct support for it should be provided. Also, this implies the in-depth understanding of how to motivate people to assume such radical changes. Also, governments should support innovation in technologies that create the sensation of human contact or that promote closer to direct human contact.

Another issue that occupied discussion time had to do with the necessity to create mechanisms through which powerful economic actors with opposing interests could be motivated to assume these changes, by, for example, including environmental costs in prices. Reducing GHG emissions in general would require this change in prices. The University as an

institution can become one of the actors generating innovation in environmental policies as well as in efficient technology development and smart buildings.

Finally, participants worried that a full virtualization would not be desirable nor feasible for some disciplines or careers, but argued that these could design flexible plans that would include assisting to some group meetings or laboratories during the year, and mobility could be made as sustainable as possible.

The back-casting exercises of the University revealed a few trends. As a public university, it is concerned both with being at the forefront of sustainability efforts, but also with maintaining the values associated with a high-quality education, such as collaborative face to face interaction, which limits the preferences for some sustainable options, such as flexible working. This is accepted only if combined with at-the-workplace hours. The value-laden nature of the institution is visible in, for example, the long discussions related to the nature and purpose of education and the philosophy that should drive it. Also, one could observe a certain conservative approach that was overcome after a while by interventions of IT specialists who contributed to giving a historical perspective to the development of technology in the last decades. Radical change is thus not easily envisioned by University members, even considering the long time span that was taken into account. Participants spoke often about the conflict between what sustainability might entail and values that are important in higher education, such as direct contact with students and colleagues, or the importance of group interaction in carrying out research. This points to the fact that promoting organizational sustainability needs to be done while taking into account the nature of organizational activity and avoiding role conflicts which could act as obstacles to motivations

for performing sustainable behavior, accepting policies that implement organizational change, or initiating actions that might support sustainability transitions.

Mobility occupied an important part of the discussions about organizational change and the pathways defined by participants show that sollutions to this traditionally change resistant area of behavior are easily envisioned by workers if they are involved in the process. The wealth of suggestions proposed as part of the pathways for change indicate that worker involvement in the definition and implementation of sustainability policy in organizations can potentially lead to the finding of creative sollutions while also contributing to increased motivation for pro-environmental behavior.

6.5. Discussion

Several policy tracks and interventions were then developed from these scenarios to be implemented in an agent-based simulation of the organization, using agent-based modeling (Matthews et al. 2007; Sánchez-Maroño et al. 2012). Such simulations allow for the testing of the effects of policies over time, in a dynamically simulated environment that takes into account both organizational and individual factors affecting pro-environmental behaviour.

These policies were tested in different combinations to see their effects on the performing of certain behaviours and related emission levels, with highly informative conclusions on the

types of policies that were likely to be most effective. Policies were derived targeting changes in three areas of environmental practice: the consumption of materials and energy, waste generation and management, and work-related mobility. More attention was paid to those practices responsible for higher emissions.

Besides the useful policy recommendations that such an exercise provides, the value of this approach lies in its potential use in organizational contexts to produce innovative worker-led sustainability proposals for transforming both production processes and everyday practices in the workplace. Trade unions are especially suitable groups for enabling this as they act at the intersection of societal concerns for jobs, worker well-being, and environmental sustainability.

Finally, both workers and managers often need to learn about how to transform organizations and make them more sustainable, or how to find solutions to the intricate connections between maintaining jobs, a good quality of life for the workers and keeping within the healthy environmental boundaries of the planet. As these problems are complex, finding solutions requires contexts of social learning, exploration and testing of options, as well as a sense of shared responsibility between workers and managers. The workplace can be seen as a community of practice, in which individuals learn and construct their identities (Wenger 1998). The 'Communities of Practice' approach stresses the importance of creating adequate conditions to link experiences, reflection, and experimentation between individuals and groups (Reed et al. 2010).

Communities of practice are important for the functioning of any organization, but they become crucial for those that recognize knowledge as a key asset. Knowledge is created,

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shared, organized, revised, and communicated within and between these communities. Communities of practice fulfill a number of functions with respect to the creation, accumulation, and diffusion of knowledge in an organization because they are nodes for the *exchange and interpretation of information; they can retain knowledge* and *steward competencies* to keep the organization at the cutting edge and, finally, they provide *homes for identities* (Wenger 2000).

Communities of practice structure an organization's learning potential in two ways: through the knowledge they develop at their *core* and through interactions at their *boundaries*. Like any asset, these communities can become liabilities if their own expertise becomes insular. It is therefore important to pay as much attention to the boundaries of communities of practice as to their core, and to make sure that there is enough activity at these boundaries to renew learning. For while the core is the center of expertise, radically new insights often arise at the boundary between communities. Communities of practice truly become organizational assets when their core and their boundaries are active in complementary ways.

7. General discussion and conclusion: integrating findings

Large scale organizations can play a key part in efforts to promote behavioral and lifestyle changes that would contribute to the mitigation of problems associated with climate change. Through their production processes and everyday activities, such organizations have a high impact on emissions, both through their direct emissions, as well as in their role as promoters of unsustainable lifestyle characteristics. Furthermore, as workplaces, they constitute an important context of everyday life, in which individuals spend a third of their time, thus holding a high potential as contexts of influence and behavioral change. Recently, there has been a growing interest in the potential of organizational transitions to sustainability, for scientists and policy-makers alike, with European regulations and the raising social alarm over climate change consequences creating incentives for a growing number of organizations

to go beyond mere window-dressing and attempt to become leaders in making sustainability a key aspect of organizational reality (Ones and Dilchert, 2012).

Universities are uniquely situated among large-scale organizations to contribute to efforts to motivate sustainable change, as they are both workplaces and spaces of learning in which new behaviors can be developed and potentially transferred to other areas of eveyday life, such as the home and other community contexts. For workers, they provide a relatively flexible environment in which new behaviors can be acquired and in which one would imagine creative initiatives to promote sustainable organizational change could be incentivized and nurtured. For students, they provide a learning context in a critical life stage of personality and attitude development that is likely to have a high influence on their subsequent identities and lifestyles. Besides their role in providing the adequate knowledge about sustainability and sollutions to problems of climate change, universities are also key influences in teaching adequate normative behavior (Lukman et al., 2013) and could be laboratories for the adoption of sustainable behaviors and the education of creative citizens that are pro-active in developing sollutions to "wicked" environmental problems. In spite of their high significance, previous research on the role of universities in promoting pro-environmental behavior for workers and students is very limited, as showed in Chapter 1, and most of the existing literature has focused on the role of environmental contents in the academic curriculum in the development of pro-environmental attitudes and behaviors (Zsoka et al., 2013; Sedlacek, 2013). When focusing on the pro-environmental behavior of university workers, previous research has been limited to using one type of methodology only (Lo et al., 2012a), focusing on one category of behavior (Scherbaum et al., 2008), looking at administrative staff only or

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analyzing a limited number of factors that might have an influence in the adoption of sustainable policies and behaviors (Lo et al., 2012b).

The research presented here has attempted to fill this gap by undertaking a comprehensive study of structural, organizational and individual factors affecting the adoption of pro-environmental behaviors in universities for both workers and students, as well as contributing to the generation of incentives (or lack thereof) for the pro-active engagement with sustainable organizational change. Four studies were undertaken with the aim to provide as complete a picture as possible on the elements and processes that could support large-scale organizations in general, and universities in particular, to implement the kind of changes required for a full transition to sustainability. A multi-method approach was used and although results obtained are most directly applicable to universities, they also contribute to the existing knowledge base on the factors influencing organizational transitions to sustainability.

The research process encompassed several stages: Study 1 performed an initial exploration of shared perceptions regarding the university´s sustainability policy and the barriers and drivers to the adoption of sustainable behavior among workers and students. The shared perceptions of existing organizational preoccupation with sustainability are considered to be a key element of a pro-sustainability organizational climate (Norton et al., 2014). Study 2 provided an in-depth exploration of structural and organizational factors influencing pro-environmental behaviour at the University. Study 3 looked at the individual-level factors that might play a role, integrating both personal constructs such as values or worldviews, as well as social factors such as norms. Study 4 used a participatory methodology to provide evidence for the

potential of worker involvement in the design and implementation of long-term organizational policy for sustainability.

Recent reviews of empirical studies of pro-environmental behaviour in organizations have revealed that there is a significant lack of research integrating structural, organizational and individual factors in the study of pro-environmental behaviour in organizations (Lo *et al.*, 2012b). Through the research process outlined in this thesis, I aimed at advancing the state of the art in the field through the in-depth investigation of each of these categories of factors and each of the presented studies pointed out to the interplay between them. Although each study provided a series of relevant results for the understanding of the complex reality of pro-environmental behaviour in the work domain, together they paint a comprehensive picture of drivers and barriers to the transformation of universities into organizations that support transitions to sustainable lifestyles. Although a discussion of results was provided at the end of each study, the main implications of the findings taken together are outlined here.

7.1. The role of external context elements

Factors influencing pro-environmental behavior in organizations range from structural and organizational, to social influence process and to individual determinants of behavior. Although each of these categories plays a role, the identification of what drives organizational efforts to sustainability requires an understanding of the specific interactions between them. External factors such as regulations and legislation, and the reputational context in which the

organization carries out its activities create specific sets of incentives (or lack thereof) for the organization, as previous research has also pointed out (Etzion, 2007).

For the case study organization, the EU policies constitute the background against which regulation is defined and implemented, but also a standard adopted by super-ordinate organizations relevant for the University, such as the CRUE. On a more technical level, the legislative framework for energy efficiency in buildings and waste management certification are perceived as adequate and as a driver for environmental practices at the university, as the in-depth interviews with key members of the University show. In the university under study, the criteria are applied in new buildings in construction, lighting systems and the use of alternative energy sources.

In the same direction, the most important influence in establishing and applying environmental criteria in university energy, mobility and waste management decisions comes from the Conference of Rectors, which is perceived as a driver and as a positive influence. Nevertheless, the criteria defined by CRUE are non-binding, which leads to a situation where there is a lack of standardized procedures to guide decisions that have an impact on university emissions. Although this is perceived as a barrier by members of management interviewed in Study 2, it is also the case that the non-binding nature of the criteria established allows for significant autonomy of universities regarding the specific forms in which environmental policy is defined and implemented. This situation creates important opportunities for setting structures in place that would go beyond token corporate social responsibility strategies to creating a culture that supports pro-environmental initiatives at all levels. In spite of clear formal commitment to sustainability, the case study university does not seem to carry this

commitment to the level of decisive policy and support for supporting voluntary pro-environmental behaviour among its workers and students.

Reputation has already been conceptualized in the business and management literature as a main driver of corporate social responsibility practices in private organizations (Hillenbrand and Money, 2007). The building and maintaining of a good reputation is a key element of economic success on the market. Even if economic success is not a key concern of public institutions, reputation has still turned out to be a key driver for sustainable practices. Reputation is related to the university´s capacity to attract students from different parts of the region or country, to attract foreign students in exchange programs and to be granted some of the recognitions established at regional or national levels.

Reputation depends on establishing a larger system of comparison among organizations of a certain type. In the case of the University, this larger system has been created through the European Higher Education Plan, which establishes certain criteria to be respected as well as generating a pressure to compete within a larger system, through a process of convergence. It is this need for convergence that has led to investments in the outside space of the University campus, by increasing the proportion of green spaces, creating social interaction and positive restoration spaces, or starting to plan for a student residence that would considerably diminish mobility-related emissions.

The structural conditions of the political, social and economic environment in which the University operates play an important role, also influencing the efforts to maintain a good reputation. As a public institution, the university needs to be responsive to the community, and to be at the forefront in its commitments and practices in terms of reflecting some of the

important social goals and values of the wider political system. It is also managed by democratically elected leaders and it interacts in policy-making with other governmental bodies. It depends on public funding and has to respond to social demands. Not being responsive to these social demands can create serious problems for the University´s reputation in the community. These aspects create favourable conditions for the adoption of pro-environmental commitments and practices, given that the wider societal context would also promote them. The present research showed that these conditions can act as both barriers and drivers for transitioning to more sustainable practices. However, it has also pointed out that formally creating an external environment that supports sustainability-oriented policies (through European legislation, and an existing comparative context of European universities) is not sufficient for organizational transformation, and that the latter is not a straighforward process but rather depends on a series of intertwined organizational, social and individual factors.

Besides the wider system in which the university needs to operate, an internal system of comparison with incentives for sustainable practices based on reputation can be established. The University of A Coruña publishes, through its Office of the Environment, an annual report with data on the environmental performance of different buildings, which host faculties and departments. Environmental performance is measured in terms of emissions and carbon footprint measures, which are useful technical measures that can inform political and technical decision-making. But this format is not sufficient to generate reputation-seeking motives. Study 2 has indicated that these data do not reach the adequate levels of decision-making (such as intermediate level leadership), nor do they contribute to a good awareness of

existing pro-environmental policy among workers at the University. As tailored feedback has proven to be an effective behavioural change technique (Abrahamse *et al.,* 2007), and results show that one important difference between behaviour at work and behaviour at home refers to the lack of economic costs for unsustainable behaviour at work, I suggest that presenting comparative performance data in less technical terms and through more accessible channels on the one hand, and establishing a system of distinctions or awards for those departments doing especially well in at least one area of sustainable practices, especially if accompanied by tangible rewards, on the other hand, could be effective ways of promoting pro-environmental behaviours at the University.

7.2. The role of the organizational type and culture

The type of organization has also proven to be an important element in setting the conditions that would promote pro-environmental behavior for both workers and students, as previous research has also suggested (Etzion, 2007). The fact that the university is a democratically governed institution creates incentives for organizational management to follow through with the implementation of measures they perceive are demanded by the organizational stakeholders. The visibility of such demand thus becomes an important driver of policy. Results of Study 2 indicate that organizational leadership perceives such demand to be low, yet both Study 1 and Study 4 indicate that facilitation of certain types of pro-environmental behavior would be welcome by staff and that there is a wealth of suggestions they could provide if the adequate context is created. Both the visibility of demand for the implementation of sustainability policy in the organization as well as the incentives for

workers to adopt a pro-active role in formulating and implementing initiatives that would improve the environmental performance of the university depend on the organizational culture and climate and the behavior that is modeled by formal and informal leaders.

Based on results of Study 2, I have argued that the type of organizational culture endorsed by the university does not support the creation of spaces for the articulation of bottom-up demand for sustainability nor the incentivization of a pro-active worker and student role in promoting pro-environmental behavior change. Based on the data gathered in Study 1 and 2, a diagnosis of organizational culture could be carried out, based on the Competing Values Framework ((Quinn, 1988; Linnenluecke and Griffiths, 2010), which showed that the case study organization endorses an internal process model of organization, which is characterized by preferences for stability and control instead of flexibility, and by an internal focus, as opposed to an external one. Some authors have argued that within such an organizational culture, pro-environmental policy for behavior change can be successful if it is framed in terms of efficiency (Linnenluecke and Griffits, 2010). However, such studies normally refer to private organizations, and although efficiency-oriented environmental policy can still play a role in public organizations, an important opportunity might be missed for public organizations such as universities, which can become environments that encourage active engagement with pro-environmental change and contexts for the learning of new behaviors. At least one attempt has been made to look at what organizational culture change towards sustainability might entail (Linnenluecke and Griffiths, 2010), and this could be a promising avenue for interventions in universities, with benefits going beyond pro-environmental initiatives to other organizational citizenship behaviors.

Organizational culture and climate also promote the endorsement of roles and goals that might come into conflict with pro-environmental ones. An example from the study of the university is the inefficient consumption of electricity due to the need to signal one´s presence in the office at all times. This example points to the need to support working roles and practices that encourage flexibility and autonomy, instead of control. Recent research has demonstrated that autonomy-supporting organizational contexts contribute to both worker wellbeing and organizational citizenship behaviors (Güntert, 2015), and autonomy is a fundamental human need (Ryan & Deci, 2000).

7.3. The role of autonomy in the adoption of pro-environmental behavior in organizations

When engaging with other disciplines to contribute to solving "wicked" problems, it seems environmental psychology is more geared to explaining stability rather than change. It is better equipped to explain why people act in a certain way and how they will react to a certain environment or policy, rather than how people come to start environmental initiatives, maintain motivation over time, or influence others to join them. It is not so much that environmental psychology does not have the tools for this, but rather that the disciplinary culture is still more rooted in a cognitive-behavioural paradigm and its reactive approach. To explain how people exert what sociologists call "agency" requires a change in our basic approach. While it is important to understand how people react to their physical and social environments, the nature and dimension of problems of climate change also require an

understanding of how people are enabled to mobilize collectively to transform their lifestyles, communities and economies in a sustainable direction (Uzzell and Räthzel, 2009). Mobilizing agency and exercising it in a transformative direction goes beyond making decisions not to use so much energy or to start using public transport. It requires people to engage in creative action with others to transform their ways of living, and propose and explore alternatives, and for social scientists in conjunction with policy-makers and practitioners to test and roll them out into larger sectors of society. External structural transformations have to be accompanied by self-transformations such that the individual understands what those transformations entail, and how participation in different collectives and collective action is beneficial (and thus becomes an intrinsic motivation).

Nudging, or what has been marketed as 'behavioural insight', is the latest solution proffered to steer individual or consumer behaviour (Thaler and Sunstein 2008). It refers to structuring the choice architecture that influences and enables individuals to make choices in desirable directions. Of course, whose desire is the question, and Thaler and Sunstein refer to nudging as "libertarian paternalism". Employing nudging as a behaviour change strategy has been spurred by at least two key factors: the first is cognitive research into the limitations of human decision-making capacities due to limited cognitive resources and the bounded rationality nature of our functioning (Kahneman and Tversky 1979). Due to information processing limitations, people rely more on habits in their everyday life so that initiating habit change through making more information about options available requires considerable mental resources (Verplanken et al. 1998). Second, the urgency of climate change requires immediate action and it is claimed that nudging can act as a necessary shortcut for the rapid reduction in

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emissions. However, many scholars argue that nudging is limited as it only produces short-lived results and not lasting changes in people's lifestyles. Moreover, and more importantly, I contend that such choice reduction leaves the human potential for transformation untapped, as it does little to mobilize the ability for bottom-up sustainable innovation, and this is especially true in organizations.

It has been previously argued that workplaces are important contexts of everyday life, due to the time people spend in organizations and the significance they attribute to it. Furthermore, universities are a particular type of organization in which an important part of staff perceives their role to be exemplary, which in turn has influence on both their direct pro-environmental behaviour, and indirectly, through their initiatives to encourage others to act pro-environmentally. Within the flexibility associated with working in a public higher education institution, and the democratic governance structures that characterize it, harnessing the perception of exemplarity to support initiatives to promote sustainability could prove to be a very effective pathway to creating a learning context for environmental behaviours.

Changes towards autonomy-supporting contexts go beyond traditional policies for organizational sustainability, generally conceptualized as a necessary part of the corporate social responsibility of organizations (Ones and Dilchert, 2012) or, more recently, as part of the core philosophy of organizations, besides profit and people (Elkington, 2007). Taken together, research on pro-environmental behavior in organizations tends to adopt a perspective of workers as rather passive recipients of organizational policy, influenced by systems of incentives to act in a certain way. Exceptions are to be found in part in research on organizational citizenship behaviors, conceptualized as voluntary behaviors that are positive

for the organization. However, given adequate contexts, workers are also active promoters of organizational change and the workplace is increasingly becoming a place in which individuals search for meaningful impact beyond making a living. Results of the four studies, taken together, show that by promoting autonomy-supporting contexts and an organizational culture that treats workers´input as a valuable and necessary part of organizational performance, the university could create an environment that would not only encourage compliance with environmental policy, but would also promote active engagement in organizational change and the learning of new behaviors.

7.4. The role of social influence processes and individual factors in the adoption of pro-environmental behavior in the workplace

In general, results of the research presented here indicate that, taken alone, individual factors have a low explanatory power for behaviors in the three categories of interest: consumption of materials and energy, waste generation and management and work-related mobility. Regression models presented show coefficients below.20, and only for a limited set of behaviors. In cases where they do play a role, identity- and social norms-related factors seem to be the most important ones, with values and worldviews not reaching significance.

Furthermore, the empirical data gathered raises some questions regarding the theoretical structure of factors such as values and norms. The structure of values is not confirmed by the adult sample, and using a multidimensional scaling technique, a more parsimonious structure

could be obtained. The theoretical structure, however, is confirmed for the student sample, which indicates that further research is necessary with adult populations. The division of norms in general and local has not been confirmed either, which points to the fact that normative references might be contingent upon specific situations and might follow different principles of organization.

Theories of psychological factors influencing pro-environmental behavior have generally been formulated for the domain of home, which makes them inadequate for the workplace, for several reasons: role assignment at work normally emphasizes role-appropriate tasks, and environmental aspects are generally secondary; systems of incentives are different, with personal responsibility and the economic costs of unsustainable behavior playing an important role in the home domain; and choice and autonomy are much more limited in the workplace than at home. Existing research on pro-environmental behavior in organizations has sometimes used elements of classical environmental psychology theories such as the theory of planned behavior or the value-belief-norm theory (Lo et al., 2012b).

Results presented here indicate that individual psychological factors might play still play a role, but only when organizational and social factors promote a context in which autonomy is supported and in which pro-environmental behavior is encouraged and modeled by leaders and suppervisors (Norton *et al.*, 2014; Ramus and Kilmer, 2007; Tudor *et al.*, 2008; Linnenluecke *et al.*, 2009). Previous research has focused on the mechanisms through which leadership has an impact on the behaviour of individual workers. Three different mechanisms have been proposed for the influence of leaders on workers: as direct motivators of ecological initiatives in the workplace, through motivational appeals (Carrico and Riemer, 2011);

through their role as relevant others and thus conveying social norms (Daily *et al.*, 2009); through conveying visible support to employees already carrying out pro-environmental initiatives, thus motivating others to follow (Lulfs and Hahn, 2013).

The theoretical models tested using a structural equations modeling technique have indicated that a social influence model is more adequate to explain pro-environmental behavior at the university for both workers and students (for recycling behavior). Previous research confirms the role of descriptive norms for voluntary pro-environmental behavior (Norton et al., 2014), but no indication on the mechanisms through which this influence might occur is provided. Analyses carried out in Study 3 provide evidence for one potential path, with descriptive norms acting upon the psychological sense of outcome efficacy, which in turn activates feelings of moral responsibility to act sustainably, thus leading to the adoption of pro-environmental behavior. Descriptive norms provide standards and models for appropriate behavior and might also contribute to perceptions of fairness and equal contribution, which might, in turn, enhance perceptions that one´s contribution is worthwhile and at the same time provide clear direction on how to carry out specific behaviors. Still further revisions of conceptualizations of individual factors in the workplace are needed, as well as theoretical development of interactions between organizational and individual factors. For example, knowledge of environmental issues in general has not proven to be relevant in the studies carried out at the university. However, it might be that knowledge of organizational policies, of ways in which organizational change can be promoted and implemented or of how suggestions for change might reach organizational management could play a more important

role in individual decisions to design and champion an organizational change strategy towards sustainability.

Furthermore, acting in line with one´s values in the workplace requires significant levels of autonomy, and certain types of organizational cultures do not encourage it, as already indicated previously. As in the case of knowledge, other types of values that are important for the work domain might not support pro-environmental behavior, such as the value of being a good, professional worker, defined in specific ways depending on the prevailing organizational culture and norms. Leadership support is closely linked to organizational culture and norms (Norton et al., 2014). Assuming responsibility for one´s behavior and its environmental impact, which is also an important element perceived to be a barrier for workplace pro-environmental behavior, also requires a context in which autonomy is encouraged, as responsibility is only assumed when behavior is perceived as freely chosen.

The way responsibility is attributed in an organization is highly relevant, as it can constitute a motivation or a deterrent for action. Although the leadership of any organization has an important role in structuring the environment in which sustainable practices take place, workers can have a key role in transitions to sustainable organizations in two directions: by complying with environmental policy and responding to behavioural incentives on the one hand, and by going beyond compliance to promote and carry forward pro-environmental initiatives that contribute to the better overall organizational performance. For both types of pro-environmental behaviours, organizational involvement and responsibility attribution are likely to play a key role. Findings indicate that workers attribute an important part of the responsibility to the university in designing the right context and providing the facilities for

pro-environmental practices to take place, but at the same time they consider the lack of environmental awareness and education to be among the main barriers to sustainable individual practices. This corresponds to a dominant perception on the part of management of low bottom-up pressure and demand for pro-environmental policy, as well as a perception that if policy affects commodity it will be politically punished.

Visibility of pro-environmental values through concrete manifestations such as regulations, policies, interventions, language and displayed behaviour of leaders is a pre-condition for the generation of a shared perception of organizational values, which is the basis of organizational climate, with research indicating strong evidence between this latter variable and pro-environmental behaviour (Norton *et al.*, 2015).

A relevant finding in study 3 refers to the role of perceptions of exemplarity in both pro-environmental behavior and efforts to encourage others to act pro-environmentally. Workers and students who perceive that their behavior is taken as a model by others are more likely to encourage others to act pro-environmentally, which indicates that role responsibility and the visibility of one´s own behavior might be important influences in pro-environmental behavior. No research has been carried out, to my knowledge, on the role of this factor on encouraging others to act, nor on the effects of exemplarity on other desirable organizational outcomes. Interventions based on increasing perceptions of exemplarity, at least among organizational leaders, could potentially yield significant results, as it would motivate leaders to display pro-environmental behavior more often, which is an important determinant of worker pro-environmental behavior (Tudor et al., 2008; Ramus and Kilmer, 2007).

8. Conclusion

The most recent review of studies of pro-environmental behaviour in organizations had stressed a series of shortcomings of existing research (Lo *et al.,* 2012b). These included: the lack of a coherent integration of organizational and individual determinants of pro-environmental behaviour, the insufficient evidence on the role of social norms and self-efficacy, the scarcity of research on general organizational determinants such as organizational culture and structure and the need for more qualitative research to illuminate the interrelations among determinants. This research aimed at filling these gaps by undertaking a comprehensive study of structural, organizational and individual factors supporting pro-environmental behaviour in the setting of a public higher education organization. An in-depth study of each of these categories of factors was carried-out through a multi-method approach and results were integrated in order to formulate a series of policy recommendations for universities.

Through the testing of theoretical models for pro-environmental behaviour, the important role that processes of social influence, and especially social norms, play for pro-environmental behaviour in organizations was shown in this research. Results showed that descriptive norms, which provide information on accepted behaviour in a given situation, influence the sense of personal efficacy, which in turn activates feelings of moral obligation to act pro-environmentally.

A lot of attention was given to general organizational determinants such as organizational culture and structure and further research into the possibilities afforded by these factors, and

the patterns of interaction between them in different organizations, is required. I have shown how a certain type of organizational culture provides both opportunities and obstacles for behavioural change policies and how understanding the type of culture an organization endorses is a key factor in promoting interventions that can achieve desired effects.

Besides voluntarily carrying out tasks in a pro-environmental way, or performing extra-role pro-environmental behaviour, workers can play a bigger role in individually and collectively promoting changes of both production processes and everyday practices in the workplace. As it has been repeatedly outlined, the present research emphasizes the role of promoting autonomy in the context of the university for both workers and students, in order to bring forth and unlock the potential of workers to bring about organizational change. Promoting autonomy also contributes to satisfaction and the development of pro-environmental identities, in turn holding the potential of practices being transferred from one life domain to another (Delmas and Petkovic, 2013; Uzzell et al., 2012).

Universities are organizations that can play a key role in this process, both as workplaces and as learning communities that educate future workers and citizens. As public organizations (at least in many cases in Europe) and workplaces, they can be frontrunners in efforts to promote workplace sustainability. They tend to be, at least in Spain, organizations that are democratically governed. They are thus particularly well-suited in also becoming autonomy-promoting contexts in which workers can play an important role in promoting sustainability oriented changes. Finally, as universities train the young generation, their have the potential and the opportunity to also educate autonomous citizens capable of initiating and

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implementing solutions to complex problems and promoting social and technical innovations that can support humanity in its quest for a decent life on the planet.

9. *Limitations of the present research*

As with all research, the studies presented here have a series of limitations as well. First, the research focused more on universities as workplaces and learning environments for their staff, and less on students. As academic staff in particular has a very important role in training the young generation, I was first interested to understand what can be done to support their pro-environmental behaviour and promote contexts that provide incentives for sustainability initiatives and organizational change efforts. Future research should dedicate more attention to the role of students and perceptions that they might have of organizational culture and climate, in order to identify the conditions that lead to their learning of pro-environmental behaviour at the university and to transferring it to other life domains.

Secondly, interactions between different social groups at the university has not been investigated through the psychological research presented here, although, in a wider project, interaction among social groups was modelled through social simulation methods and the design of a simulated social network based on the data obtained in this study. This research has already been submitted for publication. Further research could use experimental and longitudinal research designs to look at how specific support of academic staff might influence pro-environmental behaviour in students, and what perceptions students have of organizational culture and climate, which were not explored in this research, except through the construct of environmental organizational identity.

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Appendix 1:

Questionnaire on the role of individual factors

Introducción

Estimado/a participante:

Este cuestionario forma parte de un proyecto financiado por la Unión Europea y tiene como objetivo estudiar los factores que influyen en el comportamiento proambiental en el lugar de trabajo. Estamos llevando a cabo este estudio en España y en otros tres países europeos (Italia, Rumanía y Holanda).

Por favor lee atentamente estas preguntas. No hay respuestas correctas ni incorrectas, únicamente nos interesa tu opinión personal. Todas tus respuestas serán procesadas anónimamente. Cumplimentar el cuestionario te llevará unos 15 minutos. Muchas gracias por participar en nuestro estudio. Tu contribución es muy valiosa como guía de futuras políticas medioambientales!

Preguntas generales

Parte 1

Nos gustaría hacerte algunas preguntas generales sobre tu situación personal.

1. ¿Cual es tu género?

- ⚪ Masculino
- ⚪ Femenino

2. ¿Que edad tienes?

3. ¿Cual es tu nivel de educación más alto?

- ⚪ Sin estudios
- ⚪ Educación General Básica / Ed. Secundaria
- ⚪ Título de Grado/Diplomatura/Licenciatura
- ⚪ Título de Master
- ⚪ Título de Doctorado
- ⚪ Otro:

4. ¿En que nivel de la Universidad trabajas?

- ⚪ PDI en niveles de Dirección: Vicerrectores, Decanos y Directores de Centros Docentes
- ⚪ PAS en niveles de Dirección: Directores o Jefes de Servicio
- ⚪ PDI (en otros destinos o responsabilidades)
- ⚪ PAS (en otros destinos o responsabilidades)

5. ¿La función que cumples en la Universidad, resulta ejemplar para otros? Es decir, las personas que trabajan en tu Universidad consideran tu conducta como una referencia?

- ⚪ Si
- ⚪ No

¿Cuál es la localización principal de tu lugar de trabajo?

- ⚪ Elviña
- ⚪ Zapateira
- ⚪ Oza
- ⚪ Riazor
- ⚪ Esteiro
- ⚪ Serantes
- ⚪ Rectorado-Maestranza

Valores

Parte 2

Abajo verás 16 valores. Detrás de cada valor hay una breve explicación relacionada con su significado. Por favor, ¿podrías señalar lo importante que cada valor es para tí COMO UN PRINCIPIO GUÍA EN TU VIDA?

Ésta es la escala de valoración:

    -1 significa que el valor es opuesto a los principios que guían tu vida.
    0 significa que el valor no es importante en absoluto, no es relevante como un principio guía en tu vida.
    3 quiere decir que el valor es importante
    6 significa que el valor es muy importante
    7 significa que el valor es de *máxima* importancia como principio guía en tu vida; normalmente no hay más de dos de estos valores.

Tus puntuaciones pueden variar desde -1 hasta 7. Cuanto mayor es el número (-1, 0, 1, 2, 3, 4, 5, 6, 7), mayor es la importancia del valor como principio guía en TU vida. Trata de diferenciar tanto como sea posible entre tus puntuaciones de los valores, utilizando números diferentes.

	Opuesto a mis valores -1	No importante 0	1	2	Importante 3	4	5	Muy importante 6	De máxima importancia 7
1. IGUALDAD: igualdad de oportunidades para todos	○	○	○	○	○	○	○	○	○
2. RESPETO POR LA TIERRA: armonía con otras especies	○	○	○	○	○	○	○	○	○
3. PODER SOCIAL: control de los otros, dominio sobre otros	○	○	○	○	○	○	○	○	○
4. PLACER: alegría, satisfacción de los deseos	○	○	○	○	○	○	○	○	○
5. UNIDAD CON LA NATURALEZA: encajando con la naturaleza.	○	○	○	○	○	○	○	○	○
6. UN MUNDO EN PAZ: libre de guerras y conflictos	○	○	○	○	○	○	○	○	○
7. RIQUEZA: posesiones materiales, dinero	○	○	○	○	○	○	○	○	○
8. AUTORIDAD: el derecho a liderar o dirigir	○	○	○	○	○	○	○	○	○
9. JUSTICIA SOCIAL: corrección de la injusticia, protección del más débil	○	○	○	○	○	○	○	○	○
10. DISFRUTE DE LA VIDA: disfrute de la comida, el sexo, el ocio, etc.	○	○	○	○	○	○	○	○	○
11. PROTECCIÓN DEL MEDIO AMBIENTE: conservación de la naturaleza	○	○	○	○	○	○	○	○	○
12. INFLUENCIA: tener impacto sobre personas y circunstancias	○	○	○	○	○	○	○	○	○
13. SER DE AYUDA: trabajar para el bienestar de los demás	○	○	○	○	○	○	○	○	○
14. PREVENCIÓN DE LA CONTAMINACIÓN: protección de los recursos naturales	○	○	○	○	○	○	○	○	○
15. HEDONISMO: hacer cosas agradables y placenteras	○	○	○	○	○	○	○	○	○
16. AMBICIÓN: trabajo duro, aspiraciones	○	○	○	○	○	○	○	○	○

Motivaciones

Parte 3

Por favor, indica tu grado de acuerdo o desacuerdo con las siguientes afirmaciones.

Por favor indica tu opinión sobre las siguientes afirmaciones.

	Desacuerdo total 1	2	3	4	5	6	Acuerdo total 7
La mayoría de mis compañeros de trabajo se comportan de forma proambiental en la Universidad.	○	○	○	○	○	○	○
La mayoría de los españoles se comportan de forma proambiental en el trabajo.	○	○	○	○	○	○	○
Me siento moralmente obligado a comportarme de forma proambiental en la Universidad.	○	○	○	○	○	○	○
La UDC aspira a reducir su impacto medioambiental.	○	○	○	○	○	○	○
Los seres humanos pueden disfrutar de la naturaleza solamente si utilizan sus recursos de forma sabia.	○	○	○	○	○	○	○

Por favor indica tu opinión sobre las siguientes afirmaciones.

	Desacuerdo total 1	2	3	4	5	6	Acuerdo total 7
La mayoría de las personas se comportan de forma proambiental en el trabajo.	○	○	○	○	○	○	○
La mayoría de mis jefes/as se comportan de forma proambiental en la Universidad.	○	○	○	○	○	○	○
Para mí, no es costoso actuar de forma proambiental en la Universidad.	○	○	○	○	○	○	○
Me siento orgulloso/a cuando me comporto de forma proambiental en la Universidad.	○	○	○	○	○	○	○
El progreso humano se puede alcanzar solo manteniendo el equilibrio con la naturaleza.	○	○	○	○	○	○	○
La UDC es el tipo de organización que trata de reducir su impacto ambiental.	○	○	○	○	○	○	○
Los logros de la UDC son mis logros.	○	○	○	○	○	○	○

Por favor indica tu opinión sobre las siguientes afirmaciones.

	Desacuerdo total 1	2	3	4	5	6	Acuerdo total 7
Conservar la naturaleza hoy significa asegurar el futuro de los seres humanos.	○	○	○	○	○	○	○
La mayoría de mis vecinos creen que debería comportarme de forma proambiental en la Universidad.	○	○	○	○	○	○	○
Cuando alguien alaba a la UDC, lo vivo como un halago personal.	○	○	○	○	○	○	○
Para mí, es fácil actuar de forma proambiental en la Universidad.	○	○	○	○	○	○	○
La mayoría de los miembros de mi equipo de dirección se comportan de forma proambiental en la Universidad.	○	○	○	○	○	○	○

Por favor indica tu opinión sobre las siguientes afirmaciones.

	Desacuerdo total						Acuerdo total
	1	2	3	4	5	6	7
Para mí, es factible comportarme de manera proambiental en la Universidad.	○	○	○	○	○	○	○
Tenemos que reducir nuestros niveles de consumo para asegurar el bienestar de las generaciones presentes y futuras.	○	○	○	○	○	○	○
La mayoría de mis subordinados/as consideran que debería comportarme de forma proambiental en la Universidad.	○	○	○	○	○	○	○
La mayoría de las personas importantes para mi consideran que debería comportarme de forma proambiental en el trabajo.	○	○	○	○	○	○	○

Por favor indica tu opinión sobre las siguientes afirmaciones.

	Desacuerdo total						Acuerdo total
	1	2	3	4	5	6	7
Si hoy contaminamos los recursos naturales, la gente sufrirá las consecuencias en el futuro.	○	○	○	○	○	○	○
Si no me comportase de forma proambiental en la Universidad iría en contra de mis principios	○	○	○	○	○	○	○
Puedo contribuir de manera positiva a la calidad del medio ambiente comportándome de forma proambiental en la Universidad.	○	○	○	○	○	○	○
La mayoría de mis compañeros de la Universidad consideran que debería comportarme de forma proambiental en el trabajo.	○	○	○	○	○	○	○
La mayoría de las personas de mi ciudad creen que debería comportarme de forma proambiental en el trabajo.	○	○	○	○	○	○	○
La UDC considera que es importante reducir su impacto ambiental.	○	○	○	○	○	○	○

Por favor indica tu opinión sobre las siguientes afirmaciones.

	Desacuerdo total						Acuerdo total
	1	2	3	4	5	6	7
El comportarme de forma proambiental es parte importante de quien soy.	○	○	○	○	○	○	○
La calidad del medio ambiente va a incrementarse cuando me comporte de forma proambiental en la Universidad.	○	○	○	○	○	○	○
La mayoría de mis vecinos se comportan de forma proambiental en el trabajo.	○	○	○	○	○	○	○
La mayoría de la gente de este país considera que deberíamos comportarnos de forma proambiental en el trabajo.	○	○	○	○	○	○	○
La mayoría de mis superiores consideran que debería comportarme de forma proambiental en la Universidad.	○	○	○	○	○	○	○

Por favor indica tu opinión sobre las siguientes afirmaciones.

	Desacuerdo total 1	2	3	4	5	6	Acuerdo total 7
La mayoría de los miembros de mi equipo de dirección consideran que debería comportarme de forma proambiental en la Universidad.	○	○	○	○	○	○	○
La mayoría de las personas que son importantes para mí se comportan de forma proambiental en su trabajo.	○	○	○	○	○	○	○
En general, la mayoría de las personas consideran que debería comportarme de forma proambiental en la Universidad.	○	○	○	○	○	○	○
Soy el tipo de persona que se comporta de forma proambiental.	○	○	○	○	○	○	○
Puedo contribuir a la reducción de los problemas ambientales comportándome de forma proambiental en el trabajo.	○	○	○	○	○	○	○
Cuando alguien critica a la UDC, lo vivo como una ofensa personal.	○	○	○	○	○	○	○

Por favor indica tu opinión sobre las siguientes afirmaciones.

	Desacuerdo total 1	2	3	4	5	6	Acuerdo total 7
Me siento culpable si no me comporto de forma proambiental en el trabajo.	○	○	○	○	○	○	○
La mayoría de mis subordinados/as se comportan de forma proambiental en el trabajo.	○	○	○	○	○	○	○
La mayoría de las personas de mi ciudad se comportan de forma proambiental en el trabajo.	○	○	○	○	○	○	○
Los seres humanos pueden progresar sólo si conservan los recursos naturales.	○	○	○	○	○	○	○
Me veo a mi mismo/a como una persona proambiental.	○	○	○	○	○	○	○

¿Con qué frecuencia impulsas a las siguientes personas a comportarse de forma proambiental en la Universidad?

	Nunca 1	2	3	4	5	6	Siempre 7
Tus subordinados/as	○	○	○	○	○	○	○
Tus compañeros/as de trabajo	○	○	○	○	○	○	○
Tus superiores	○	○	○	○	○	○	○
El equipo directivo de tu Centro o Unidad	○	○	○	○	○	○	○

¿Con cuántas personas te relacionas a lo largo de un día?

Comportamiento en el trabajo

Parte 4

Por favor, contesta las siguientes preguntas relacionadas con tu comportamiento en la Universidad.

Aproximadamente, ¿cuántos vuelos has cogido por razones de trabajo en los últimos dos años? (si no recuerdas con exactitud, indica lo que crees)

Aproximadamente, cuántos de éstos han sido:

☐ Peninsulares

☐ Europeos

☐ Transoceánicos

Aproximadamente, cuántos de éstos han sido para:

☐ asistir a congresos, conferencias y otras reuniones de trabajo:

☐ participar en tribunales de tesis:

☐ participar en comisiones de plazas:

Cuando vienes a trabajar, ¿con qué frecuencia vienes en coche?

Nunca						Siempre
1	2	3	4	5	6	7
○	○	○	○	○	○	○

De media, ¿cuántos kilómetros viajas a la semana en coche entre la universidad y tu casa?

Cuando viajas por razones de trabajo, ¿con qué frecuencia viajas en coche?

Nunca						Siempre
1	2	3	4	5	6	7
○	○	○	○	○	○	○

De media, ¿cuántos kilómetros a la semana viajas por razones de trabajo (viajes profesionales)?

Por favor indica con qué frecuencia tienes los siguientes comportamientos.

	Nunca						Siempre
	1	2	3	4	5	6	7
Cuando viajas por razones de trabajo y tienes que ir a un sitio que está a menos de 5 kilómetros, ¿con qué frecuencia utilizas transporte público, bicicleta, o caminas, en lugar de utilizar el coche?	○	○	○	○	○	○	○
Cuando utilizas el coche por razones de trabajo, ¿con qué frecuencia conduces de una manera eficiente desde el punto de vista energético (mirando hacia adelante y anticipando los movimientos del tráfico, acelerando y frenando tranquilamente y cambiando a una marcha superior tan pronto como sea posible)?	○	○	○	○	○	○	○
Cuando vienes a trabajar en coche, ¿con qué frecuencia compartes coche en lugar de viajar solo/a?	○	○	○	○	○	○	○
¿Con qué frecuencia utilizas vídeo o e-conferencias en lugar de reuniones presenciales en tu trabajo?	○	○	○	○	○	○	○

¿Tienes control personal sobre el manejo de las luces en tu espacio de trabajo?

○ Sí

○ No

¿Cuántas horas al día están encendidas las luces en tu espacio de trabajo?

¿Con qué frecuencia tienes las luces encendidas en tu espacio de trabajo cuando no hay nadie allí?

Nunca						Siempre
1	2	3	4	5	6	7
○	○	○	○	○	○	○

¿Con qué frecuencia apagas las luces en tu lugar de trabajo cuando te vas a casa y no queda nadie en tu despacho?

Nunca						Siempre
1	2	3	4	5	6	7
○	○	○	○	○	○	○

¿Utilizas ordenador en tu trabajo?

○ Sí

○ No

¿Con qué frecuencia apagas el ordenador cuando te vas a casa?

Nunca						Siempre
1	2	3	4	5	6	7
○	○	○	○	○	○	○

¿Tienes control personal sobre el termostato de la calefacción en tu espacio de trabajo?

○ Si

○ No

¿Cuál es la temperatura media en tu espacio de trabajo cuando estas trabajando? (si no estas completamente seguro/a, indica lo que crees)

○ Menos de 18°C

○ 18°C

○ 19°C

○ 20°C

○ 21°C

○ 22°C

○ 23°C

○ 24°C

○ Más de 24°C

Durante el año, cuando estás trabajando ¿con qué frecuencia enciendes la calefacción?

Nunca						Siempre
1	2	3	4	5	6	7
○	○	○	○	○	○	○

¿Tienes control personal sobre el aire acondicionado en el trabajo?

○ Sí

○ No

○ No existe sistema de aire acondicionado

Durante el año, cuando estás trabajando ¿con qué frecuencia enciendes el aire acondicionado?

Nunca						Siempre
1	2	3	4	5	6	7
○	○	○	○	○	○	○

Por favor, indica con qué frecuencia tienes los siguientes comportamientos.

	Nunca 1	2	3	4	5	6	Siempre 7
¿Con qué frecuencia utilizas papel reciclado en el trabajo?	○	○	○	○	○	○	○
¿Con qué frecuencia separas el papel del resto de los residuos en el trabajo?	○	○	○	○	○	○	○
¿Con qué frecuencia separas el plástico del resto de los residuos en el trabajo?	○	○	○	○	○	○	○
¿Con qué frecuencia utilizas tu propia taza en lugar de vasos de usar y tirar en el trabajo?	○	○	○	○	○	○	○

Por favor, indica con qué frecuencia tienes los siguientes comportamientos.

	Nunca 1	2	3	4	5	6	Siempre 7
Cuando estás en el trabajo, ¿con qué frecuencia lees los correos electrónicos en la pantalla del ordenador y no impresos?	○	○	○	○	○	○	○
En el trabajo, ¿con qué frecuencia utilizas la cantidad mínima de papel posible cuando imprimes? (ej.: 2 páginas por hoja, por las dos caras etc.)	○	○	○	○	○	○	○
En el trabajo, ¿con qué frecuencia utilizas el correo electrónico en lugar del correo postal?	○	○	○	○	○	○	○
En el trabajo, ¿con qué frecuencia utilizas procedimientos on-line en lugar de en papel (formularios etc.)?	○	○	○	○	○	○	○

Comportamiento en casa

Parte 5

Por favor contesta a las siguientes preguntas relacionadas con tu comportamiento en casa.

Aproximadamente, ¿cuántos vuelos has cogido por razones personales en los últimos dos años? (si no recuerdas con exactitud, indica lo que crees)

Aproximadamente, cuántos de éstos han sido:

☐ Peninsulares

☐ Europeos

☐ Transoceánicos

Cuando te desplazas por razones personales ¿con qué frecuencia utilizas el coche?

Nunca 1	2	3	4	5	6	Siempre 7
○	○	○	○	○	○	○

Por término medio ¿cuántos kilómetros recorres en coche a la semana por razones personales?

Por favor indica con qué frecuencia tienes los siguientes comportamientos.

	Nunca 1	2	3	4	5	6	Siempre 7
Cuando te desplazas por razones personales y necesitas hacer un recorrido de menos de 5 kilómetros ¿con qué frecuencia utilizas el transporte público, la bicicleta o caminas, en lugar de utilizar el coche?	○	○	○	○	○	○	○
Cuando te desplazas por razones personales ¿con qué frecuencia conduces de una manera eficiente desde el punto de vista energético (anticipando los movimientos del tráfico, frenando y acelerando tranquilamente y cambiar a una marcha superior tan pronto como sea posible)?	○	○	○	○	○	○	○
Cuando te desplazas por razones personales ¿con qué frecuencia compartes coches en lugar de ir solo/a?	○	○	○	○	○	○	○

Por favor indica con qué frecuencia tienes los siguientes comportamientos.

	Nunca 1	2	3	4	5	6	Siempre 7
¿Con qué frecuencia tienes las luces encendidas en una habitación en casa cuando no hay nadie allí?	○	○	○	○	○	○	○
En tu casa ¿con qué frecuencia dejas los aparatos electrónicos (como la tele, vídeo, pc) en stand-by?	○	○	○	○	○	○	○
En casa ¿con qué frecuencia apagas tu ordenador cuando sales de casa o te vas a dormir?	○	○	○	○	○	○	○

¿Cuál es el ajuste de la temperatura media en tu sala de estar cuando estás en casa?

○ Menos de 18°C

○ 18°C

○ 19°C

○ 20°C

○ 21°C

○ 22°C

○ 23°C

○ 24°C

○ Más de 24°C

Durante el año, cuando estás en casa ¿con qué frecuencia enciendes la calefacción?

Nunca 1	2	3	4	5	6	Siempre 7
○	○	○	○	○	○	○

¿Tienes sistema de aire acondicionado en casa?

○ Sí

○ No

Durante el año, cuando estás en casa ¿con qué frecuencia enciendes el aire acondicionado?

Nunca 1	2	3	4	5	6	Siempre 7
○	○	○	○	○	○	○

¿Con qué frecuencia pones la lavadora, cuando no está del todo llena?

Nunca 1	2	3	4	5	6	Siempre 7
○	○	○	○	○	○	○

Por término medio ¿a qué temperatura pones la lavadora?

- ○ En frio
- ○ 30°C
- ○ 40°C
- ○ 60°C
- ○ 90°C

¿Con qué frecuencia secas la ropa fuera en lugar de utilizar una secadora?

Nunca						Siempre
1	2	3	4	5	6	7
○	○	○	○	○	○	○

¿Cuántas veces te duchas a la semana?

Por término medio, ¿cuántos minutos tienes el agua corriendo cuando te duchas?

¿Cuántas veces a la semana te das un baño?

Por favor, indica con qué frecuencia tienes los siguientes comportamientos.

	Nunca 1	2	3	4	5	6	Siempre 7
¿Con qué frecuencia utilizas papel reciclado en casa?	○	○	○	○	○	○	○
¿Con qué frecuencia separas el papel del resto de los residuos en casa?	○	○	○	○	○	○	○
¿Con qué frecuencia separas el plástico del resto de los residuos en casa?	○	○	○	○	○	○	○
¿Con qué frecuencia separas las pilas del resto de los residuos en casa?	○	○	○	○	○	○	○
¿Con qué frecuencia separas el vidrio del resto de los residuos en casa?	○	○	○	○	○	○	○

Por favor, indica con qué frecuencia tienes los siguientes comportamientos.

	Nunca 1	2	3	4	5	6	Siempre 7
¿Con qué frecuencia compras productos con un mínimo de embalaje?	○	○	○	○	○	○	○
¿Con qué frecuencia rechazas las bolsas de plástico en tiendas?	○	○	○	○	○	○	○
¿Con qué frecuencia compras productos orgánicos?	○	○	○	○	○	○	○
¿Con qué frecuencia comes carne durante la comida principal del día?	○	○	○	○	○	○	○

Código

Nos gustaría poder repetir este cuestionario una vez más para medir la evolución de la opinión. Con el fin de relacionar los cuestionarios cumplimentados por la misma persona, y garantizar a la vez tu anonimato, cada participante recibirá un código personal. Este codigo consiste en:

Las dos primeras letras de tu lugar de nacimiento:

Tu mes de nacimiento en cifras (en este formato: Enero = 01, Febrero =02 etc.):

Las dos primeras letras del nombre de tu madre:

Las dos primeras letras de tu nombre:

Por ejemplo: Alguien que ha nacido en CORUNA, en Julio (= **07**), cuya madre se llama MARIA y cuyo nombre es José Luis tendría el código **CO-07-MA-JO.**