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Patterns of sustainable production and consumption in large-scale organizations: Multi-method approaches to the study of workplace practices

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Abstract

Patterns of unsustainable production and consumption have been recognized as main causes of climate change. Despite cross-cutting multidisciplinary research and policy efforts in most European states it has not been possible to achieve significant changes in consumption and production, as it has been recognized by the progress report on the EU's Sustainable Development Strategy 2008 (ECORY, 2008). Most research on sustainable consumption and production coming from the social sciences has concentrated on households and individuals as relevant actors in achieving a more sustainable society and little research has been undertaken on sustainable consumption and production in the workplace. The present paper aims at briefly presenting the "Low Carbon at Work: Modelling Agents and Organizations to Achieve Transition to a Low-carbon Europe" (LOCAW) project, a European Union FP7-funded project which aims at advancing understanding of the barriers and drivers to sustainable lifestyles by researching the determinants of everyday practices and behaviours in the workplace. The project focuses on six large-scale organizations, occupying different positions in the sustainability debate. The multi-method approach of the project is presented, with a special emphasis on the use of back-casting scenarios as an innovative methodology that can help design sustainable change patterns in organizations. Finally, this paper will present the preliminary results of the first part of the project, which focuses on the diagnosis of everyday practices in the workplace. Both the back-casting scenarios methodology and the preliminary results will be presented by referring only to the Spanish case study of the project.

Keywords: drivers and barriers, sustainable lifestyles, large-scale organizations, the workplace, multi-method approaches.

Introduction and focus of the LOCAW project

As a key practice of everyday life, work is a place and space where the sometimes contradictory demands of economic profit and environmental sustainability meet and are negotiated, with the resulting effects on work practices, energy consumption and greenhouse gas emissions. As people spend an important part of their lives at work, within a community of values, norms and everyday practices, it is also the place where identities are negotiated, where individual values are transformed and where sustainability-related behaviour is either promoted and rewarded or hindered and discouraged (Brown, Kirpal & Rauner, 2007). Large scale organizations (e.g. Universities) can impact on consumption patterns in two different ways. On the one hand, by creating a context which promotes environmentally-friendly behaviours and, on the other, by introducing policy designed to reduce overall organizational consumption. In addition, workers of universities have the potential to promote environmentally responsible behaviour models in other areas of life and be active as civil society members in environmental protection organizations (Álvarez, Vega and García-Mira, in press).

The LOCAW project aims at providing an understanding of the drivers and barriers to sustainable lifestyles by researching the determinants of everyday practices and behaviours in the workplace and then using these results to create agent-based models (see Sánchez-Marroño et al., 2012) that would simulate the complex environments of large scale organizations of both the private and the public spectrum. The agent-based models are constructed as tools to test policies intended to introduce change in organizations and their results can provide interesting insight into policy-making at all levels. The project focuses on three relevant areas of workplace practices, which contribute to the greenhouse gas emissions of the different organizations under study. These are: the consumption of material resources and energy, waste generation and management, and work-related mobility. Large scale organizations have been chosen because of their significant conjoint contribution in the European Union to greenhouse gas emissions, and also because of the high potential for change that they hold, considering the number of employees they have.

Large organizations are responsible for a significant amount of GHG emissions. An estimation in the year 2000, which considered 8 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 % CO₂, 18 % Methane, 9 % Nitrous Oxide (Emission Database for Global Atmospheric Research, 2000).

The emissions generated by large organizations result from their production processes and the pressures under which they function within our economic system. Following the new EU regulations, national governments have also passed laws concerning emissions and have created policy instruments designed to reduce or compensate the level of emissions of specific organizations in order to reach national and European goals. As a result of these new regulations, organizations have also started to implement mechanisms to reduce their GHG emissions. However, as stated in the EU Sustainable Development Strategy Review 2009, these strategies have not been sufficient to ensure significant reduction rates. To better articulate efforts undertaken by relevant actors towards sustainability, we need to identify the barriers to and drivers of *sustainable changes in everyday practices in the workplace*.

Each of the case studies focus on one large scale organization in a different EU country. In four of the cases, the focus is on the everyday practices of the organization itself and the interactions between structural/organizational conditions and individual factors in generating barriers to and

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drivers for a sustainable transition to a low carbon Europe (the cases in Spain, Romania, The Netherlands, and Italy). While the interactions of the organizations with relevant outside agents forms part of the study of structural conditions in these cases, two case studies are ethnographic studies of two companies, including their management, their trade unions and their workforce. These two case studies also look at the relationships between everyday behaviors at work and behaviors outside work (in the United Kingdom and in Sweden). The six organizations occupy different positions in the sustainability debate: thus, two of them are heavy industry and private organizations (Volvo, Sweden and Shell, UK), two are public organizations (the University of Corunna, Spain and the Municipality of Gröningen, the Netherlands) and finally two are dedicated to environmentally-friendly services, one being a producer and provider of energy from Renewable sources (Green Enel Power, Italy), while the other is a water service provider (Aquatim, Romania).

A multi-method approach to the study of sustainable practices in the workplace

The LOCAW project uses a multi-method approach in order to analyze everyday practices at work and the relationship between practices at work and practices outside of work in large-scale organizations, mixing qualitative (focus-groups, structured observation, in-depth interviews and life-history interviews) and quantitative (questionnaires) methods. It also uses back-casting scenarios to define change in the studied organizations, and agent-based modelling to synthesize results and test policy tracks.

The first part of the project has provided a diagnosis of existing practices at work, relevant for achieving sustainable working behaviors. The diagnosis has allowed us to understand the existing situation in each organization in the six case studies and to further orient the study of the determinants of everyday practices in the workplace. For the second part, research instruments were tailored to examine macro- and micro factors influencing everyday behaviors and practices and the relationship between them, and this was done by using a combination of document analyses, life-history interviews and a questionnaire study. So far, data was collected on the macro-, or structural, factors affecting practices in the workplace, while the questionnaire study is being finalized soon.

The third part of the project looks at the relevant social actors within the company (i.e. management, unions, and the workforce), and at the relationship between behaviors at work and outside work. Finally, the fourth part of the LOCAW project will synthesize information from all the previous workpackages and will design agent-based models of the six case-study organizations, based on this synthesis.

This paper will focus on the case study of the University of Corunna, and will present some of the preliminary results obtained from the diagnosis, as well as the design of the back-casting scenario methodology, in the study of the patterns of sustainable consumption and production in the workplace.

The use of back-casting in the study of sustainable practices in the workplace

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 & 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 & Quist, 2011). It has a strong normative component, as it starts from desirable future states or set of objectives and then analyzes 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 (Börjeson et al., 2006; Dunn, 1994). Some deal with what will happen and they have also been called “business as usual scenarios”, as they are based on actual trend extrapolation. 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.

The second class of scenarios deal with what could happen and this class includes all types of forecasting exercises, foresighting 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 such events 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.

Finally, the third class of scenarios deal *with what should happen* and this is where back-casting scenarios fit in. They have started to be more widely used in the field of sustainability and climate change because they seem to perform better in taking into account the systemic nature of 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.

Back-casting scenarios are a very useful methodology when dealing with “wicked” problems, that are highly complex, that involve various social actors with conflicting interests and require systemic changes and transitions if they are to be addressed adequately. There are many different types of back-casting scenarios and their design depends on important decisions about their design, each of which has important consequences for both the results obtained and the future implementation of the policies derived from them.

One important decision 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 endpoint 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

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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).

Another important decision 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 *et al.*, 2011; Quist *et al.*, 2011), as it creates learning, a stronger attachment to the goals, and a stronger feeling of empowerment. Participatory back-casting thus tends to be a favourite option in many recent studies and interventions, as it creates the conditions for a stronger stakeholder involvement and also the motivation and institutional investment for implementing the necessary changes to reach the commonly established and desired goals. Nevertheless, sometimes experts are involved together with sophisticated tools allowing instant feedback on the effect of the proposed policies on the desired objectives, yielding interesting and useful results as a tool of democratic policy development (Robinson *et al.*, 2011).

Within the LOCAW project, attention is given to both these issues and scenario development workshops have been tailored to fit each of the organizations under study. Attention is given to both the development of the future images and to the process of achieving the images. In the case study of the University of Corunna, the back-casting scenarios development has been designed to ensure both a rich representation of the future, and the possibility of buy-in on the part of the university management and workers. Thus, the development of the scenarios is divided in several parts. The first part is dedicated to the creation of the future image and this is done with different university groups and over different sessions. The University allows for a combination of expert and workers input, and, taking advantage of this situation, the first workshop has been organized with people that are faculty at the university and also belonging to areas of teaching and research that are relevant for the focus of LOCAW. We ensured a combination of disciplinary backgrounds and expertise, ranging from technology experts, environmental engineering, environmental economy, environmental law, to the humanities and social sciences representatives. This provided us with a mixed group with a range of relevant knowledge, who, at the same time, are familiar with the organization and are members of it. Various posterior sessions will be developed with the university management, administrative staff and students, in order to expand on the original vision and to consider aspects relevant for this other university groups that might not have been considered by the first group. Visions will thus be expanded and enriched with these contributions, and this iterative process will also allow for wider participation of stakeholders, which, in turn, can contribute to the development of commitment to these future visions.

After the process of creating the visions is over, the back-casting itself will be done in one session with a single group, that will mix members from the previous group, with the exception of the management group, which will meet separately, for rather obvious reasons. This part of the process will centre on developing the necessary steps to implement the future vision, on the actors that are to be involved in implementing it and on the potential collaboration issues that might arise and how to overcome them. The policy tracks that will result from this process will afterwards be used as a basis for the agent-based models and some of them will be tested in a simulated environment. Towards the end of the LOCAW project, the results of this simulation will be presented to the back-casting groups and the model will be improved with their feedback.

Preliminary results: the University of Corunna case study

The University of Corunna 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. 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. Its direct and indirect impact on society is considerable, as it can form citizens who are knowledgeable of environmental problems and solutions in our society today and who also know how to act in sustainable ways both in their homes and in the workplace – and are motivated to do so.

The diagnosis phase of the everyday practices at the University of Corunna showed a very interesting and mixed picture. A combination of document analysis, interviews with key informants and focus groups was used. The team had access to the website, brochures, environmental and social reports, and other relevant documents with information about the environmentally-relevant activities being promoted by the University. In order to understand what has been done so far by the University to promote environmental policy that would contribute to a reduction of GHG emissions, as well as what is still missing, the following actions were carried out:

- a) An interview with the director of the Office for the Environment (OFE), a structure integrated within the Vice-Rectorate for Infrastructure and Environmental Management;
- b) A review of the web of OFE;
- c) Printed documents belonging to the Office for the Environment;
- d) Website and organizational documents of the University.

Taking into consideration the size of the University, and its territorial distribution (8 locations), a practical tool was built in order to conduct the interviews with key informants. This tool, built as a questionnaire, was distributed among Deans, Head of Departments, Porters, Heads of Administrative Services, Heads of Financial Units, as well as a number of Faculty staff. A total of 200 questionnaires were distributed, taking into consideration the distribution of gender, campus and building locations. The tool was designed to collect relevant information about everyday practices in the workplace, and identify barriers and drivers of sustainable behavior at work.

The questionnaire was structured in such a way as to provide information on three categories of practices:

- a) Consumption of materials and energy
- b) Waste generation and management
- c) University-related mobility

For each category of practices, questions were made regarding three types of evaluations:

- 1) The perception of the respondent about the actual observed practices of the staff in his his/her building.

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- 2) The perception of the respondent about the importance s/he thinks the University gives to these practices.
- 3) The perception of the respondent about the importance s/he thinks the other workers give to these practices.

The composition of the focus groups was designed to ensure that all categories of university members were represented. Thus members of each focus group included students, academic staff, administrative staff, people occupying leadership positions related to the environmental aspects of the organization and people representing unions within the organization. Both focus groups were audio-taped and then analyzed using ATLAS.ti. Both audio documents were analyzed and quotations were determined, to which codes were assigned. The conceptual areas defined were:

1. *Attitudes* (evaluations made by the subjects on different aspects of the organization, related to the dimensions studied within LOCAW – consumption of resources and energy; waste management; and organizational-related mobility)
2. *Barriers* (perceived obstacles in transforming the organization into a more sustainable one and reducing GHG emissions)
3. *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)
4. *Responsibility assignment* (attributions of responsibility for the existing situation within the organization)
5. *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).

The image resulting from this study is a complex one in the University of Corunna. There are a few things that are worth noting as general trends that we can disentangle from the mosaic of findings already presented in this report. First, we can easily note that workers in general are aware about the importance of developing sustainable behaviours, as it is shown by the fact that they report changes in their behaviour at home in the last three years in the area of energy consumption, waste generation and management and mobility.

The reported changes coincide with the areas on which governments and mass-media have focused in their campaign, which indicates that some of these have been effective but also indicate the fact that individually-driven change is difficult to find. This is an important conclusion to be taken into account when studying spill-over behaviours between home and work and the possibility of implementing strategies that have worked in the household environment into the organizational context of the university.

Secondly, we can see that there is a big gap between university policy and intended strategies to promote sustainable practices in the workplace both through structural changes such as adaptations of infrastructure and technology and through human changes such as campaigns to change behaviours at work, and the perception workers have about this policy.

From the analyses we have undertaken in the workpackage dedicated to diagnosis, we can conclude that this is due to various factors. First, the university strategies as evidenced by the analyzed documents tend to be top-down strategies that do not include established structures of participation of relevant university groups and are mostly centred on changing infrastructure and creating the

contextual conditions for more sustainable consumption, waste management and mobility practices. Thus, they do not rely on strategies targeted at changing workers behaviour or on campaigns of raising environmental awareness. The only strategy that might lead to an increase in environmental awareness is the dissemination of environmentally friendly measures taken in infrastructure adaptation. The risk of having this as the only behaviour-changing strategy is that the University might spend significant amount of money in adapting the infrastructure but if behaviour does not adapt, then it will not achieve all the reductions in CO₂ emissions that it could.

Secondly, both in the focus groups and in the interviews with key-informers, we find that the general perception is that the University either does not attribute importance to sustainable practices and does not establish them as a priority, or the perception is that it does not do enough to transform it into a sustainable organization. This shows a very deficient communication strategy in the University, because, as it was revealed in the focus group discussions, there are numerous measures that the university has taken that are virtually unknown to the workers and the University community in general.

Thirdly, university members attribute most responsibility for transforming practices at work into more sustainable ones almost entirely to the university. This justifies a state of passivity and it might reinforce the management's perception that there is no use for adopting behaviour changing measures beyond infrastructure adaptation. Even when university members list personal values, attitudes, or awareness among the factors that determine sustainable behaviour at work, they still consider the development of these attitudes or awareness to be the responsibility of the institution, who should design campaigns to raise that awareness.

These findings suggest that the University management should make it a priority to establish better participatory consultation structures that would ensure that members of the university community would participate into every step of the process of decision-making on sustainability issues, in order to not only make their voice heard but, most importantly, to become motivated to act sustainably in the work place, as people are more likely to become motivated in projects and strategies they helped define.

Conclusions

This paper has presented the objectives and approach of the LOCAW project, which aims at identifying barriers and drivers to sustainable lifestyles by studying practices and behaviours in the workplace, and focusing on six case-studies of large scale organizations in six different European countries. It has also presented the multi-method approach of the project, with a special emphasis on the back-casting scenarios methodology and some preliminary results obtained from the diagnosis phases of LOCAW.

A multi-method approach allows us to investigate the complex issues of patterns of consumption and production in the workplace and of the factors that influence them and reach conclusions that can help define policies to curb emissions in the workplace within the context of the European Union. Within LOCAW, both qualitative and quantitative research methods are used, and this will provide us with a complete picture of the interaction between structural and individual factors in achieving transition to more sustainable organizations. Also, the action research methodology of back-casting scenario development allows us to define future policy directions in a participatory fashion, thus creating the possibilities for implementation of patterns of sustainable production and consumption in all kind of organizations.

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As we described above, the preliminary results of the diagnosis of work-related practices in the case study of the University of Corunna, already provided very interesting insights into policy proposals that could help change some of the problematic everyday practices. Research undertaken within the next stages of the project is starting to clarify the role of different factors in determining these practices, both at the structural level (political, economic, social, and organization-specific factors), and at the individual level (values, motivations, identity). The complex picture resulting from the different stages of the research will help us formulate policy proposals that can guide European, national and regional policy-making.

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