ENVIRONMENTAL KNOWLEDGE AND THE ADOPTION OF READY MADE ENVIRONMENTAL MANAGEMENT SOLUTIONS

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In this article we study organizational learning with respect to environmental management or corporate greening in six UK water and electricity utilities, concentrating on information acquisition and dissemination. We find that companies make use of a variety of information acquisition strategies, including learning from experience, e.g. environmental incidents leading to prosecution; learning by observing other organizations (bench-marking); by importing environmental knowledge through outside experts and management systems and by building up an information searching and collecting system. Environmental managers play a heavy role in acquiring and disseminating information. We feel that, while organizations try to rationalize environmental learning and make it as efficient as possible, a lack of redundancy of information, heavy reliance on a limited number of outside sources of expertise and the use of environmental management systems may also bring with it the danger of institutionalizing environmental management and closing environmental questions prematurely. Copyright © 2000 John Wiley & Sons, Ltd. and ERP Environment.

INTRODUCTION

In this paper we look at corporate environmental management and the process of 'corporate greening' from the perspective of organizational learning and knowledge generation. The paper is based on comparative case studies of environmental management in six UK water and electricity utilities. Managing environmental issues in companies is characterized by environmental uncertainty, increased complexity and ambiguity, all of which constitute 'occasions for sensemaking', according to Weick (1995). Uncertainty is increased by a mounting but not particularly consistent public concern about 'green' issues and by a rapidly growing body of environmental legislation. Complexity is increased by 'greening' or environmental management because there is one more aspect

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of the business to manage and many environmental issues are in themselves very complex, even for scientists, let alone managers with no training in ecology.

Although explicit treatments of corporate greening from an organizational learning perspective are rare the need for organizational learning is implied in a fair proportion of the environmental management and 'greening' literature, e.g. Throop *et al.* (1993) and Shrivastava and Hart (1995). Hunt and Auster (1990), Winsemius and Guntram (1992) and Zeffane *et al.* (1995) all suggest that companies need to develop ways to scan, monitor and learn from environmental incidents and information. Post and Altman (1994) develop an organizational learning model of environmental change, which is basically in line with a strategic, organization–environmental alignment notion of learning, and Lenox and Ehrenfeld (1997) look at environmental design within the framework of a resource based notion of organizational capabilities and organizational learning.

The evident relevance of organizational learning concepts to the study of environmental management combined with the present dearth of studies explicitly taking such a stance suggests that a close reading of case studies of 'corporate greening' within an organizational learning framework will be useful both for practising managers, in terms of improving the efficiency of environmental management and learning, and as a contribution to academic understanding of the 'greening' process and ways in which it can be improved or speeded up. We therefore hope that this article will find an audience both among practising managers and academic scholars.

METHODOLOGY

Data for this research was gathered through six case studies in the water and the electricity industries. We looked at three water and sewerage companies (one of them part of a multi-utility company), two regional electricity companies (RECs – companies set up to deal with electricity distribution although some

have invested in limited generation capacity) and one multi-utility company, comprising both water and electricity utilities. For competitive reasons the companies did not want to be identified in this article and are referred to as Water 1, Water 2, Water 3, Electricity 1, Electricity 2 and Multi-Utility.

Data was gathered mainly through semi-structured interviews, augmented by documents such as policy documents, environmental performance reports, strategy documents and similar. In each company we interviewed between 12 and 15 individuals, selected from different levels in the organizational structure and hierarchy. Our respondents were chosen through theoretical and snow-ball sampling and included group directors, group environmental and other staff, divisional directors and senior managers and divisional environmental staff. Interviews lasted between 45 minutes and two hours. They were mainly tape recorded and fully transcribed. Where this was not possible, extensive notes were taken during and immediately after the interviews. Second interviews (sometimes via telephone) were carried out with some key respondents to clarify issues.

ORGANIZATIONAL LEARNING FROM AN INFORMATION PROCESSING PERSPECTIVE

The literature on organizational learning and the learning organization is by now very extensive and diverse. Easterby-Smith (1997) distinguishes six streams of literature on organizational learning – (1) psychology and organizational development, (2) management science, (3) sociology and organization theory, (4) strategy, (5) production management and (6) cultural anthropology – and one further stream which deals with the related but somewhat different concept of the learning organization. As dealing with all these aspects – relevant though they are – is clearly impossible within the scope of a single article we limit our discussion to the second stream of research identified by Easterby-Smith (1997), which looks at organizational learning from a management science or information

processing perspective and concerns itself with issues such as the nature of organizational knowledge, memory and holistic views of learning. Huber (1991) identifies four constructs related to organizational learning: (1) information acquisition, (2) information dissemination, (3) information interpretation and (4) organizational memory. Within information acquisition he identifies five sub-constructs, i.e. (a) knowledge available at the birth of the organization, (b) learning through experience, (c) learning by observing other organizations, (d) learning by grafting onto itself the knowledge possessed by individuals outside the organization or by other organizations (e.g. through hiring experts or acquiring other companies) and (e) learning by noticing and searching for relevant information outside the organization.

Given that environmental management as a formal aspect of running a company is a relatively new phenomenon, information acquisition was found to be of central concern to many managers involved in environmental management. All six companies had embarked on a formal programme of environmental management within the last five years or so, i.e. since privatization. There was, of course, a certain amount of environmental knowledge available prior to establishing formal environmental management procedures. Water and sewerage companies regard themselves as environmental businesses and, in a sense, all people working on the operating side have environmental knowledge of some sort. Likewise, managers in the electricity companies felt that their engineers had always adopted environmentally responsible procedures and had a certain amount of – tacit – environmental knowledge to allow them to do this. At the same time, it was also felt that this existing environmental knowledge was often defined by regulatory requirements and confined to relatively narrow operational procedures.

> The core business is environmental improvements. So we are extremely expert on that. [. . .]We accept that we are not necessarily an expert organization on [wider] environmental issues. [. . .] We need to educate ourselves the best we can (Chief Scientist (Environment), Water 3).

Certainly if you talked to some of our engineers, yes, they were concerned about putting underground cables where we can, and as I say we were doing trenchless excavation long before the environment became the issue in society that it is now (Divisional Director, Electricity 1).

INFORMATION ACQUISITION

We found evidence of all four methods of information acquisition described by Huber (1991). Learning from experience could take a number of different forms. Any major incidents, such as led to prosecution by the Environment Agency (the UK environmental regulator), normally turned this environmental issue into an area of priority. Thus Water 1 had implemented ISO 14000 because they felt the tight procedures involved in the system gave them a safeguard against accidental spillage of chemicals or sewage works failures.

> I tell you the reason why they like [EMS] so much. Because on sewage treatment they have turned the ISO 14000 into an iron procedure [. . .] which means that the supervisors and the area manager can sleep at night. [. . .] It stops the deliverer of [a chemical] from having his own key, opening his own tank, and dumping it all in the clear water tank in the water treatment works. As happened at Camelford. It prevents the inspector from turning the valve the wrong way, as happened in Headingley (Environmental Director, Water 1).

Experiences to prompt learning could also take less dramatic forms. In the electricity companies one of the most significant direct environmental effects was thought to be leakage from oil-filled underground electricity cables. Both Electricity 1 and Electricity 2 were in the process of building up a system that would allow detecting and locating leaks earlier and more reliably. These systems were built internally, based on the company's own

data and experiences. As described, the process was one of gradual learning, where the companies felt they became progressively better at detecting and dealing with leaks.

Environmental auditing and reporting also showed signs of learning from experience. Most managers involved in this suggested that it had taken them several years to arrive at the measurements and indicators that they used now and that these would need further refinement in the future.

Learning from experience is only one of the ways in which the companies in our study acquired environmental knowledge. Adopting 'best practice' and copying what other companies were doing, the third sub-construct of information acquisition identified by Huber (1991), was an important part of dealing with environmental issues. Respondents frequently mentioned best practice and felt reassured if they realized that other companies were managing environmental issues in a similar way to their own.

> And also it is comforting to know that since we're doing it, I know of two of the RECs that have done exactly the same. It seems to be the right direction (Group Environmental Co-ordinator, Electricity 1).

We feel that this tendency to be guided by what other companies are perceived to be doing is leading to a certain level of conformity and institutionalization of environmental knowledge and management practices within industries.

In a similar way, environmental management systems could be used to import knowledge from outside the company. With the exception of Water 1 none of the companies had at the time decided to aim for a certified environmental management system, such as ISO 14000, but all companies except Electricity 2 were adopting at least parts of an environmental management system.

> The first thing we did was to look at a set method of dealing with the environment, which seemed to be the BS 7750 route (Group Environmental Co-ordinator, Electricity 1).

We also found numerous instances of the fourth method of information acquisition identified by Huber (1991), whereby an organization grafts onto itself the knowledge possessed by an individual or an organizational unit that was not previously part of the organization. In our study this mostly took the form of taking on knowledgeable individuals from outside, either on a permanent or on a temporary basis. Perhaps surprisingly, permanent environmental posts within the organizations were only rarely filled with environmental experts from outside the company. Most of the environmental management teams were appointed from within the company and environmental managers or co-ordinators had often little previous expertise in environmental issues. Nonetheless a significant amount of grafting took place, most commonly in the form of hiring environmental consultants, either to do specific tasks or to help setting up an entire environmental management system.

> Consultants were hired to help us into environmental management as a separate entity [. . .] because alone we would not have all the necessary resources and also because they are in touch with what's going in across a spectrum of industrial areas. So, it gives us an outside view, it gives us an outlook of independence (Group Environmental Co-ordinator, Electricity 1).

> We've effectively kicked that off with this, which is the environmental baseline review, by external consultants obviously. Two of the main outputs from this are a register of effects, impacts effectively, and a register of legislation, which are two of the main components of an environmental management system anyway (Divisional Environmental Co-ordinator, Multi-Utility).

The consultant's input was often expected to lead to more build-up of environmental knowledge within the organization itself, so that less reliance on outside help would be necessary in the future.

[. . .] very quickly when you go and see consultancy at work you think: 'I could do that. Is that what I'm paying £600 a day for? Thanks very much. We'll do our own next time, thank you' (Group Health, Safety and Environment Manager, Multi-Utility).

Some respondents voiced concern that environmental consultants did not necessarily seem to come up with the right answers in a particular situation or that their knowledge of environmental management was limited.

What worries me about the development of courses and training is that the consultants [. . .] that may be able to impart the knowledge to the managers responsible for the individual areas [. . .] don't understand environmental management either. So they are more interested in providing consultation, expertise on writing environmental policy, environmental protocols, not in training people in environmental management techniques (Sewage Treatment Area Manager, Water 2).

Similar to the effect of adopting best practice and industry wide codes, the widespread use of environmental consultants – often the same firms, even the same consultants are used by several firms – also contributes to a certain amount of institutionalization of environmental management practices.

The fifth sub-construct of information acquisition identified by Huber (1991) is where companies actively notice and search for information related to the area where knowledge is deemed to be insufficient. Such searching activity was mostly the responsibility of the environmental manager or other members of small central environmental management teams. Middle managers frequently felt that this was the most time efficient way in which the organization could acquire environmental knowledge, although environmental staff sometimes complained of information overload.

I get more information on the environment through my desk than four or five people in regulation get through their desks (Group Environmental Co-ordinator, Electricity 1).

Really, we leave all that to [the environmental co-ordinator. He] pulls that together for all aspects of the company, whether it be transport, whether it be our generation business, whether it be the network engineering activity. [. . .] That allows me to continue to run the operation because [. . .] there is a danger that if everybody in their own division starts trying to look at environmental issues as well, there is going to be a lot of duplication and there is no way we're going to pull it all together (Transport Manager, Electricity 1).

INFORMATION DISSEMINATION

Environmental managers or teams are also seen very much as the main agents of dissemination of environmental information within the company, bringing together people, passing on information, collating environmental data etc. Five of the six companies in our study had realized a need to put environmental information flows onto a somewhat more formal basis. This could take the form of environmental committees or panels at top management level (Multi-Utility and Water 1) or consisting of environmental experts from outside the company (Water 2) or a regular exchange of ideas and information at a middle management level (Electricity 1 and Water 1). Pooling of experiences was normally found not to be easy, particularly between people who worked in different parts of the company and did not meet each other on a regular basis.

While pooling the, usually explicit, knowledge of environmental co-ordinators across the organization could be done through regular forum meetings, managers mentioned that it was more difficult to tap the usually tacit environmental knowledge of operational staff and make it available and useful across the company (see Nonaka, 1994, for a discussion

of explicit and tacit knowledge in an organizational context). Some managers felt that strict operating procedures could make the – normally already difficult – task of tapping tacit knowledge even more difficult.

> With downsizing, and with the need to have consistent procedures across the company, there is a danger that we might have pushed people into frameworks that might not be the most effective way of doing things, environmentally. And they will know [. . .] what good practice is, or how they could do it better. And we're actually constraining them in some ways from that, either through time constraints or budget constraints or by saying that this is a standard procedure that you adopt. So it is about taking off the shackles (Group Environmental Advisor, Multi-Utility).

Water 2 had established a series of employee involvement mechanisms, including an annual environmental project competition, 'green groups' and an environmental suggestion scheme. The main benefit was seen to be increased employee motivation generally, and for environmental issues specifically. However, most respondents also felt that these efforts could play a valuable role in making staff's tacit environmental knowledge available throughout the company.

While Huber (1991) looks at knowledge and learning very much in terms of streams of information flow, Nonaka (1994) points out that information is not the same as knowledge. Rather, knowledge is created and organized by the flow of messages that constitutes information. This view suggests that 'information dissemination' is in fact more than distributing chunks of information throughout the organization. Rather, through the process of sharing knowledge and information new forms of knowledge are created, individual knowledge may be transformed into organizational knowledge, and tacit knowledge may be transformed into explicit knowledge and *vice versa*. According to Nonaka (1994) this process is aided by a certain degree of 'redundancy of information'.

There did not currently seem to be much 'redundancy of environmental information' in the companies. Environmental knowledge almost seemed to be 'rationed' to those people who were perceived to need it most. Managers expressed the feeling that training and learning needed to be structured to avoid 'duplication' and overloading people with environmental information that they did not need.

> The managers obviously get a different type of training to what the site operatives get, slightly different emphasis. The operatives need to know the practicalities and how to actually do it. The broader understanding of why is less important, the legislation is even less important than that, because it's a lot to ask them (Divisional Quality and Environment Co-Ordinator, Water 1).

The tendency of some middle managers, already mentioned above, to leave all environmental learning to the central environmental manager or team would further reduce any redundancy of information.

DISCUSSION AND CONCLUSION

In this brief exploration of environmental learning in six UK water and electricity companies we have mainly looked at how companies acquire information about environmental issues. We found some learning from experience and also significant amounts of learning by copying other organizations and through grafting. The latter two strategies seem to be leading to an institutionalization of environmental management practices within and also across industries.

Within the aspects of organizational learning about environmental issues presented in this paper it is possible to identify a number of potentially problematical tendencies. One of these lies in the fact that in a number of organizations learning about environmental issues seems to be mostly limited to a number of key individuals, usually those with an official environmental brief. While this probably

reduces uncertainty and the amount of manpower that needs to be devoted to environmental learning it may also limit the amount and effectiveness of learning itself. This is compounded by the reported difficulties in pooling environmental expertise within companies. No direct access to learning opportunities (Huber, 1991) and difficulties in pooling individual experiences (Levinthal and March, 1993) have been identified as barriers to learning in the literature.

Institutionalization of environmental learning and environmental management practices is also not without its problems. Stinchcombe (1990) suggests that uncertainty is often reduced by reliance on the first available information that will give some direction without this necessarily being the most appropriate solution. The question arises of whether the reliance on environmental solutions developed outside the organization may be an example of this. Furthermore, Levinthal and March (1993) suggest that organizations are usually quite adept at exploiting the innovations developed by others, which leads to the spread of 'best practice' but may limit the overall amount of innovation in an industry. From these perspectives an institutionalization of environmental management practices in order to reduce uncertainty and increase efficiency may actually lead to premature closure of environmental questions, which could have detrimental effects on the overall development of new ways of thinking about and dealing with environmental issues.

This raises a number of implications for both practical environmental management and scholarly endeavour. On the practical side managers may be able to counteract the dangers described above through conscious effort. 'Redundancy of information' may be fostered by exposing as large a number of staff as possible to environmental issues and knowledge and by finding ways in which environmental information is disseminated throughout the organization and which involve more and other staff than just the environmental team. Discussion fora and staff involvement schemes such as attempted by some of the participating companies may be helpful in this respect. More effort to improve environmental knowledge and involvement at all levels of the organization may also reduce the need to rely so strongly on outside experts and what we think is the danger of premature institutionalization of environmental management and hence closure of environmental questions.

In this article we have only looked at a very limited aspect of organizational learning, i.e. information acquisition and dissemination. As outlined earlier many other approaches to organizational learning have been developed and future research could fruitfully look at those aspects of organizational learning in the context of corporate greening. Strategic and cultural implications of organizational learning as well as the relationship between learning and power are particularly likely to shed further light on the process of corporate greening and how it might be furthered.

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