

Training in environmental management - industry and sustainability

Part 2 The role and requirements of categories of lower management and workers

John P. Ulhøi, Henning Madsen and Susanne Villadsen, The Aarhus School of Business

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This study was carried out by a research team at the Aarhus School of Business consisting of:

Associate Professor John Parm Ulhøi, PhD, Department of Organisation and Management;

Associate Professor Henning Madsen, PhD, Department of Information Sciences;

Research Assistant Susanne Villadsen, MSc;

Project Assistant Christine S. Sundstrup, BA;

Project Assistant Marie Louise Kjaer, BA;

Project Assistant Mads Frederiksen, BA;

Project Secretary Rita Madsen, Dipl. In LSP; and

Project Secretary Steve Churchill, BSc.

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John P. Ulhøi is Associate Professor at the Aarhus School of Business, Denmark (Department of Organisation & Management). He has a Master's degree in Urban and Regional Planning and a PhD in Business Administration. He has research and teaching experiences in the fields of Strategic Management, Technology Management, Technology Assessment and Corporate Greening and has published several papers in these areas. He is a reviewer for four international journals and has organized and chaired sessions at international conferences.

Henning Madsen is Associate Professor at The Aarhus School of Business, Denmark (Department of Information Science). He received his Master's degree in mathematical economics from the University of Aarhus and a PhD in business economics from the Aarhus School of Business. He has chaired sessions at several international conferences and has also acted as referee. His current research interests include Technological Forecasting and Forecasting in Environmental Analyses.

Susanne Villadsen is a research assistant at the Aarhus School of Business, Denmark (Department of Organisation & Management). She has a Master's degree in Business Administration from the Aarhus School of Business. Her current research interests include Strategic Environmental Management, Environmental Performance Measurement and Environmental Reporting.




Foreword

Education and training has for some time been recognised as an important element in the improvement of environmental and resource management performance in all sectors of economic activity, and its significance was emphasised in the recommendations in the Community's Fifth Environmental Policy and Action Programme. This, together with the fact that a number of, mainly larger, companies, notably in manufacturing industry, had started to develop new and innovative corporate environmental strategies, led to a proposal at a European Round Table on "Industry, Social Dialogue and Sustainability" in late 1992, that the Foundation should include a project on Training in Environmental Management in its four-year programme 1993-1996.

The aims of the project were:

- to identify the environmental management training requirements in industry in the light of EU policies aimed at sustainable development and the new corporate responses and to indicate how these requirements can be met and the structures needed;
- to ensure a better and more effective response to the new challenge of industrial management relating to environmental protection and improvement and the associated health and safety issues, resource management and economic performance; and
- to contribute to a better implementation of EU environmental policies and to increase environmental awareness among the workforce in industry.

For practical and financial reasons the project was divided into three stages, each of them covering one of the three groups primarily involved in the implementation of the new corporate strategies, i.e.:

- top/executive management with responsibility for the development of industrial and business strategies;
- categories of lower management and workers; and
- categories of middle management.

The first part of the project was carried out in 1993-1994 and covered Denmark, Germany, France and the U.K.. It was based on existing literature, enquiries and case studies and looked into corporate environmental and resource management introduced in recent years in a number of European companies and the education and training provision which is and will be required in relation to managers concerned with developing integrated and environment-related industrial and business strategies. It analysed the new environmental management practices, the higher education and training of the relevant categories of future managers as well as the inadequacies of and mismatches between providers and users of higher management education. It also discussed some of the major obstacles to improvements of the present situation and potential solutions which might contribute to closing, at least, part of the gap identified between the higher management education and training provisions and the needs of industry. Moreover, this part of the project provided the basis of the following stages in relation to corporate managerial practices and the definition of corporate sustainability.

The present work contains the findings of the second part of the project, covering Denmark and Germany only, which was undertaken in 1995 and combined existing knowledge and original research (an enquiry and case studies). It focused on the role and education and training requirements of categories of lower management and skilled and semi-skilled workers in the light of the new corporate environment-related strategies and highlighted, inter alia, some of the key issues raised by the new practices at the shop floor and the perceptions and response of the workforce. It also analysed the content and quality of the courses provided at vocational training establishments and elsewhere, the teaching approaches, the qualifications of the teachers/instructors involved and the problems they were facing, e.g. regarding the lack of adequate teaching materials, the lack of time and the insufficient access to retraining. Furthermore, it examined the possibility of developing a coordinated approach to environmental education and training of lower management and workers.

The report was discussed at a meeting on 2 October 1996 in Brussels to enable representatives of the employers, trade unions, governments and the European Commission - the constituent bodies of the Foundation's Administrative Board - to evaluate the findings of the research. The participants recognised that the report had limited scope insofar as it was only one out of several reports on different aspects of the same subject and only covered two Member States. They would have liked to see more Member States included in the work, but were aware that the resources available had not enabled the Foundation and the researchers to do so. This, together with the fact that the report was primarily based on case studies, made it difficult to draw general conclusions from the findings. The work had, however, achieved what was possible on the basis of the information gathered and otherwise available from various sources, and it made a good



contribution to existing endeavours by the Foundation and others in this area and was particularly useful in this wider context.

There was an important link between new skills and employment, and hence it was crucial that further training be encouraged at all levels and that rights to lifelong training be ensured. The potential of new training approaches and measures, including distance learning, should be further explored and made available for personnel at the shop floor level. There was no doubt that industry might have to carry a substantial part of this burden, although it should be kept in mind that enterprises were increasingly faced with new challenges and the pressure to remain competitive. Thus, new training requirements were likely to affect SMEs in particular.


The problems associated with the lack or inadequacy of existing teaching materials raised in the report was stressed by the participants, who felt that the services of the Commission might have to become more involved in the development and provision of such materials than they were at present, through the Euro-Info Centres, for instance.

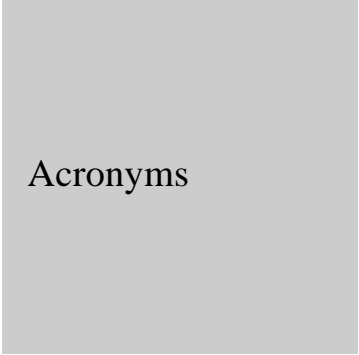
The participants also felt that new information structures would have to be created to raise the environmental awareness of employees, and that the type of information to be provided should be looked into. The existence of reward schemes linked to cost savings was another important element which might motivate employees to become more interested in the environmental performance of their companies, as was the appointment of 'green delegates'.

Finally, it was suggested that it would be useful if the Foundation in its future work could address not only the role of the social partners, but also the role of other actors and different cultures as well as the impact of different sectors (e.g. transport and tourism) on environment-related training and training needs.

Raymond-Pierre Bodin
Director

Eric Verborgh
Deputy director





Acronyms

AMU	Vocational Training Centres in Denmark
CEO	Chief Executive Officer
CFC	Chlorofluorocarbon
CO ₂	Carbon dioxide
DCTU	The Danish Confederation of Trade Unions
EU	European Union
FIU	Internal Training Unit of the Danish Confederation of Trade Unions
HRM	Human Resource Management
HSE	Health, Safety & Environment
ICC	International Chamber of Commerce
ILO	International Labour Organisation
M-10	Course offered by the Internal Training Unit of the Danish Confederation of Trade Unions
TEM	Training in Environmental Management
UK	United Kingdom
BS 7750	British Standard 7750 - The British Environmental Certification Standard
USD	US Dollar
DS/INF 75	The Danish equivalent of BS 7750
SME	Small and Medium sized Enterprises
EMAS	Environmental Management and Auditing Scheme - EU's Environmental Standard
ISO 9001	International Quality Certification Standard





Introduction

The business sector is widely recognised as having a key role in ongoing and future efforts to achieve sustainable development in both products and services. However, there is a strongly felt need to involve the business sector in general, and industry in particular, more actively in this vital process (see, for example, the World Commission's Report on Environment and Development, and the EU's Fifth Environmental Policy and Action Programme) in order to ensure improved resource management and high environmental standards.

One important element in this development is the creation of a new form of awareness and alertness, based on a recognition of the interdependency between the natural (ecological) and man-made (economic) systems and a proactive and innovative business approach, and seeing such endeavours as a challenge capable not only of reducing production costs, but also of opening up entirely new markets to serve increasing green demand.

The current debate on how to achieve a better balance between economic development and environmental protection is becoming increasingly reflective. It is characterised by a broader awareness and social debate about the interrelation and complexity of issues to which existing social, political and economic practices have so far failed to adapt. The intellectual and practical challenge of reformulating and restructuring these relationships to reflect environmental issues should not be underestimated. Industrial sustainability is difficult, in part because the relationships on which it is built transcend several levels of social and ecological organisation. The various actors include board members, shareholders, senior managers, line managers, lower management, workers, customers, suppliers, local communities and regulators, all of whom not only have an important influence on the environment and health at both local, national and international levels, but are also expected to consider or implement new environmental initiatives and practices.

The environment is rapidly permeating every level of the company, from top management to the shop floor, making existing training backgrounds and job descriptions obsolete. Not only must there be a correlation between the requirements of corporate managers and business school curricula, but vocational training curricula at lower levels in the educational system must also adjust to the new situation. In other words, it is essential that vocational training institutions for lower operational management and skilled and semi-skilled workers also include environmental issues in their programmes. The same applies to in-house training activities.

As noted in the TEM 1 study (Ulhøi et al., 1996), a number of companies have already taken up the challenge, and more are following. Such efforts not only require the introduction of new and innovative corporate strategies, but also the continuous training of employees at all levels. It is therefore crucial that, throughout the EU, education in general, and vocational training in particular, responds swiftly and adequately to these requirements. In the present situation, extensive retraining of the workforce will be needed over the next 5-10 years just to enable industry to live up to current environmental demands.

Relation to previous Foundation studies

In 1993, the Foundation initiated a four-year programme of studies on training in environmental management in the EU. The focus of the programme is on corporate environmental and resource management and the educational and training needs of existing and future managers with responsibility for corporate management, including the development of environmental strategies. The first study, TEM 1 (Ulhøi et al., 1996), was followed up by the present study, on the role and training requirements of workers and lower management (the TEM 2 project), and will be followed by another study on the role and training requirements of middle management (TEM 3).

While the present study is thus closely related to the first, it is also a further development of previous Foundation research on education and training in environmental protection and improvement (e.g. ECOTEC, 1992). Though the context is more or less the same as in 1993, the emphasis of the present study is different. Here, the focus is on the job activities and education and training of certain categories of lower management and skilled and semi-skilled workers - especially those who have a direct influence on both the internal and external environmental, resource management and health and safety performance of the company.

Research objectives and definitions

The aim of the present research project is, for the EU in general, and for Germany and Denmark in particular, to identify, analyse and/or assess (with a focus on lower management and skilled and semi-skilled workers, including foremen, gangers, HSE representatives, etc.):

- the adequacy and shortcomings of the existing approaches and strategies of environmentally-leading corporations and vocational training institutions in the EU in promoting more environmentally benign practices;
- the discrepancies between existing vocational education and training programmes, and the practices, needs and requirements of industry;

- the possibility of using human resource management appraisal as a management tool for improving internal corporate environmental management performance;
- major financial, HRM and /or technical constraints;
- the possibility of developing through a Community-wide cooperation among Member States a coordinated approach to the environmental education and training of certain categories of workers and lower management.

Lower management refers to managers with limited responsibility for a small number of workers. They are predominantly trained as skilled workers and started out as such. Typical examples include foremen and gangers.

It should be noted that some authors have suggested differentiating between training and education. Training is thus defined as an improvement in a person's technical skills, while education is defined as improvements in a person's human skills (Majchrzah, 1988). Bridge and Salt (see, for example, Maquire et al., 1993) define training as learning and training opportunities after the completion of basic education. In the following, however, the two terms are to some extent used synonymously, as in much of the literature.

Finally, although the main intention was to obtain information about the external environment, it became obvious during the TEM 2 project that, in using the term "the environment", it was not always possible to preserve an explicit and strict distinction between the external and the internal environment. This also proved to be the case in TEM 1.

Methods

Objectives of the data collection

The overall objective of the data collection was to identify leading vocational training institutions and companies in relation to environmental performance, both to identify the present state-of-the-art and to compare the activities and plans of vocational training establishments with the requirements of business organisations. The data collection project was designed with this in mind.

Structure of the data collection

The data collection method was designed in accordance with the overall approach of the TEM 1 study (Ulhøi et al., 1996). In order to identify state-of-the-art vocational training institutions and companies with respect to environmental activities, the data collection was divided into three phases.

Phase I

In Phase I, selected resource persons, especially those at vocational training advisory centres, etc., who could indicate leading vocational training institutions and companies in relation to environmental awareness and training activities, were identified and contacted.

The selection of resource persons was based on existing personal research networks, a survey of participants at recent conferences and workshops, a survey of authors of relevant literature, and organisations and government agencies concerned with industry, education and vocational training, and the environment. In this phase, relevant information collected, but not used, during the TEM 1 study was included whenever possible and appropriate. This resulted in 285 names in 15 European countries.

Phase II

Phase II involved selecting, contacting, and collecting information from the institutions, etc., named in phase I. This resulted in a list of approximately 80 vocational training institutions and other providers of training activities in 12 countries which included courses, etc., on the environment. In addition, a number of new companies were identified besides those included in the TEM 1 study.

To begin with, available written material was collected from companies on environmental activities in general and environmental training activities in particular, and from vocational training institutions regarding their educational programmes, curricula, and other training initiatives, including environmental subjects. This material was later analysed (see below).

However, it was soon realised, and later confirmed by several of the key informants, that none of the Member States actually had much useful information on, or even an overview of, environmental management education and/or vocational training. This was unexpected, and it was therefore decided to drop the original idea of inter-country comparisons. Furthermore, the materials that were collected from vocational training institutions varied considerably and was generally not very extensive. After a reassessment of the study objectives, it was also decided to include more in-depth studies from a smaller number of institutions and companies in just a few countries, in order to give a more complete picture based on individual examples.

Denmark and Germany were selected for this part of the study, notably for the following reasons:

- the TEM 1 study showed that Denmark and Germany have a long history of environmental protection and legislation;
- it also revealed that environmental management training differed somewhat between the two countries;
- preliminary investigations showed that Germany and Denmark were among the most environmentally progressive countries in relation to vocational training activities.

From the list drawn up in phase I, 13 educational institutions and other providers of environmental courses and 10 companies in Germany and Denmark were selected and invited to participate in the study. This formed the sample for phase II, in which the subsequent in-depth, semi-structured personal interviews were carried out.

It is important to note that this sample is not meant to constitute a representative sample, from which generalisations about European industry and educational institutions can be made. The sole intention is to identify and describe typical examples of the state of the art in industrial environmental management and business environmental education and related trends.

Phase III

Since the collected material and employee interviews only gives a first impression of how employees see the environmental situation of their own company, how their job influences the environment, how they obtain environmental information, how they improve their basic education through courses, etc., and their attitude to environmental matters in general, it was decided to carry out a more general survey.

Owing to various budgetary and other practical constraints, it was decided to carry out a structured questionnaire survey of approximately 500 Danish workers who have participated in an environmental course provided by the Danish Confederation of Trade Unions during the past five years. The questionnaire was based on the interview guide developed for the employee interviews at the companies visited.

Data collection

The data collection method

In order to provide a broad overview of the situation in EU countries, information was collected from a survey of the literature, available documentary materials (which were generally of a limited and varied nature), and consultations with key persons from industry and vocational training establishments.

In view of the environmental situation in companies and vocational training institutions, the data collection method had to be flexible enough to allow the researchers to follow up interesting leads and issues. On the other hand, some level of standardisation was also needed. This was achieved by a combination of a content analysis of the material received and personal semi-structured interviews, which involved designing both a registration form for the material analysis and (based on the former) interview guides for the interviews.

Developing tools for data collection and data analysis

The material analysis framework had to take account of differences in the information published by vocational training institutions, as well as differences between categories of lower management and skilled and semi-skilled workers. However, companies tend to disclose specific information about their environmental activities and initiatives for internal use only, and as such is regarded as being strictly confidential. Vocational training institutions, on the other hand, publish descriptions of environment-related educational initiatives primarily for students and lecturers. The main aim, therefore, to the extent that it has been possible, was to evaluate the content and

form of the information in the case of companies, and record the characteristics of teaching and research activities in the case of institutions.

The company material analysis was based on the same registration form used in TEM 1, since it includes a special section on internal training activities, etc.

A second registration form was developed to analyse the environmental training activities of vocational training establishments. As regards teaching, the aim is to clarify the main characteristics of environmental educational initiatives at the institution in question. Teaching initiatives are described for a number of parameters, including the type of educational activities, educational approaches, and the materials used. This results in a register of environmental management courses and educational approaches.

The main aim of the interviews in the companies was to provide an understanding of how increasing corporate environmental concern, as reflected in training needs and requirements, was perceived/experienced on the shop floor. The interview thus both supplemented - and was supplemented by - the material analysis. Accordingly, the interview guide was divided into nine subject areas, based partly on the structure used for the material analysis, including knowledge of the environmental consequences of their job, special training activities, knowledge of the company's environmental policy, and attitudes to environmental matters in general.

Interviews were generally carried out by two interviewers (a senior researcher and an assistant), using a tape recorder (except for six interviews in a Danish company) and field notes. One interviewer concentrated on asking the questions and guiding the interview, while the other took notes and asked occasional supplementary questions. At the end of the interview round, the field notes and (65) tapes were transcribed on a PC while the interviews were still fresh in the minds of the interviewers. The tapes were then listened to again in order to catch any vital information that might have been missed the first time and to correct any misinterpretations. Compared with "standard" methods, in which interviews are typically carried out by students or other third parties and the transcripts typed by secretaries, this "dual" approach not only increases the validity and reliability of the data, but also optimises the time available. It should be noted that the method used in transcribing the tapes is not "ad verbatim", but transcription by issue, i.e. the respondent's answer to a specific question is registered in shortened form, and not necessarily in the respondent's own words. However, the precise meaning and context of the responses are the same.

As with the material analysis, the interview guide for vocational training institutions was divided into environmental-management-related teaching activities, including subjects covered, teaching methods, as well as drivers and barriers.

The interviews with key representatives from the vocational training institutions in Germany (7 interviews) and Denmark (6 interviews) were carried out as taped telephone interviews.



Data analysis


The collected data consisted of annual reports, environmental reports, internal confidential documents, course descriptions, press materials, leaflets, booklets, books, folders, etc. Two reports were written, one for companies and one for vocational training institutions. Analysing the interview transcriptions and the material analysis results, and then structuring the information into groups of issues, produced two syntheses for each report. These two syntheses constitute the actual results of the survey, and are included in condensed form in this report.

The information obtained from the questionnaire survey was analysed using the SPSS statistical program.

Based on an analysis and synthesis of the findings of the previous stages, the final stage of the study involved identifying and assessing the problems and potentials associated with, and discrepancies between, environmentally leading operational practices and lower management and skilled or semi-skilled worker training needs and requirements.

In reading this report, the following should be kept in mind:

- All information mentioned in this report has been collected during the project period 1994-95;
- there is an ongoing development of existing training and education as well as management practices and initiatives;
- all participants have been guaranteed full confidentiality - thus no specific information in the report can be linked to either an individual company or educational institution;
- it is the general policy of the research team not to rank countries, companies or educational institutions according to environmental performance.



Environmental management: operational initiatives and training requirements

This chapter starts with a broad outline of environmental management practices in selected EU countries, with an emphasis on operational aspects. It includes previously unpublished results from the TEM 1 project, and thus describes the situation from a managerial perspective. Chapter 2.2s and 2.3 describe the situation in Germany and Denmark from the employees' point of view. The examples chosen illustrate the scope and variety of industry approaches.

It should be noted that legislative regulations vary from country to country. Thus, in Denmark, damage to the environment is normally the company's responsibility, whereas in Germany the individual employee can be held responsible.

Introduction

The UK

Companies inform their employees about environmental matters in various ways. One company, which carries out an annual survey of employees' attitudes to environmental communication, found that, in 1992, 1/3 of employees felt they received enough information about environmental policy, while almost half felt they did not. In another company, which also carried out a survey in 1992, employees were generally favourable towards the company's environmental activities, although more than half felt that the company had failed to inform them sufficiently about environmental matters.

Some companies use video as a mean of communication. One company has made an environmental awareness video aimed at employees who are in direct contact with customers, in order to brief them on the company's environmental activities. Another company has developed

an environmental awareness programme for employees in job-specific training. The programme comprises a video, which is designed to raise issues and concepts, and four work booklets for use either at home or at work, entitled: "Your environmental values", "Managing waste", "The power generation industry", and "You and your workplace".

Printed materials, e.g. newsletters and handbooks, are often used as a means of communication. Other examples include internal memorandums for key employees and managers, environmental bulletins for all employees, environmental newsletters for employees and other stakeholders, employee handbooks on how to minimise the environmental impact of business trips, and brochures about environmental policy. A few companies had also set up discussion groups and environmental clubs, which were run by employees but financed by the company.

A considerable number of companies use training as a means of communicating environmental information, and many managers see this as an area of key importance. Some of the interviewed managers stated explicitly that environmental training is an integrated part of the normal training programme (e.g. the introduction to a job will include information about the environmental consequences of not doing the job properly), while other companies offer environmental training as specialised courses. Several managers also regard training as a method of speeding up the greening process.

A typical example of an environmental training programme in one of the surveyed companies included: (i) a description of the company's environmental policy, main achievements to date, the company's worldwide environmental symbol, together with some of the products which bear it, and (ii) recycling and packaging policy, including examples.

Companies have different policies about employee participation in environmental training. In one company, there must be one qualified person in every workshop who is capable of giving advice on saving energy. Another company said that, in their HSE department, there was a need for both technical training for technical solutions, and for employees who can handle all aspects of environmental issues.

In general, managers thought that "their" employees were fairly interested in the environment, and that environmental initiatives, ideas and projects were both top-down and bottom-up. However, several managers recognised the need for motivation. One company had adopted a "we-need-your-help" attitude, because it did not regard money as a sufficient incentive. In another company, employees were given the tools as well as the possibility of forming committees and applying for financial support. This motivated employees to suggest a whole range of improvements, something which would not have occurred if management had just told them what to do.

One multinational company stressed the need to use different motivation methods in different cultures, although this did not rule out the exchange of experiences between countries. Management was also trying to develop a single corporate culture among all those involved in

their HSE operations worldwide - including management, employees, contractors, partners and regulators.

Denmark

Most of the Danish companies include lower levels of employees in their environmental activities. In one medium-sized company, 25% of the workforce had attended a meeting to discuss the initiatives being considered. This has since been followed up by environmental training for all employees.

Another company has tried to obtain employee acceptance through a massive information campaign. The first step in incorporating an environmental dimension was to make sure that everybody feels responsible for and committed to the project. It thus started with an intensive information campaign, including a competition for the best environment-related ideas. This was followed up by including environmental information in the (monthly) company magazine. In addition, general information about environmental issues is given to all new employees before they start their job.

In yet another Danish company, employees' knowledge of and ("right") attitudes to the environment are considered crucial to the success of corporate environmental management. Here, the training of foremen and skilled and semi-skilled workers is to be carried out in 3 stages, gradually moulding attitudes and building up knowledge and skills. In this company, the environment dimension is part of the health and safety system, through which a lot of environmental information is spread. The company also has an ideas box (good ideas are rewarded financially) and a newsletter with articles/information about the environment. Environmental management is seen as putting common sense into a framework - good housekeeping.

The starting point of a fourth corporate approach, adopted by a medium-sized Danish company, was that effective environmental management has to focus on what the individual employee can do for the environment. An attempt was made to produce an employee handbook on production, the environment, policies, goals, etc. The next step was supposed to consist of directly specifying what each employee can do for the environment, as well as incorporating environmental aspects into the training programme. However, the environment manager is still uncertain how committed employees are to the environment.

France

One French approach was based on an environmental improvement process, including demonstrations of practical examples, communicated through an internal newspaper, magazine, and direct dialogue. The company's management, which considers education to be a vital part of the path to sustainable development, intends to improve the environmental training given to employees, both specialists and generalists. The annual information meeting on the general performance of the company, which is open to all employees, also includes information about the environment.



Another company had developed a systematic five-year environmental training programme for all employees, including managers. The programme consists of two parts: (i) a general course on environmental issues and problems, which is the same for all employees, and includes a speech by the CEO, videos, lectures, etc., and (ii) company-, regional- and plant-specific courses dealing with more specialised problems. Every employee will receive a booklet about the environment and the company's initiatives. The scheme has no direct financial incentives or bonuses, although one year there was a cash prize in an "environmental innovation" competition. In the future, 3 prizes will be awarded: (i) a team prize for environmental initiatives in R&D; (ii) a prize for general environmental management in the plant; and (iii) a prize for external environmental communication. The prizes are awarded for everyday attitudes towards the environment.

Germany

Many German managers also view training and education as a crucial element of environmental initiatives. Some environmental managers said that training seminars with an environmental component have been held regularly at all levels, and that every employee is expected to train his or her colleagues in safety and environmental aspects. They also emphasised that environmental training must be a continuous process, and that all employees, both new and old, should have a basic understanding of environmental issues. Many companies hold after-work courses, courses in materials analysis and the environment, and training programmes for reducing waste.

Employee motivation regarding the environment was often mentioned by corporate managements as being crucial to the success of any training efforts. Employees can be motivated through communication and information, by discussions, seminars, workshops and newsletters, and through inspections, as well as by training. A few German companies provide monetary incentives, e.g. for suggestions leading to environmental improvements, while others do not. Several managers said that employees have come up with many good ideas and suggestions which have, for example, led to better working conditions and cost savings.

Practices in Germany

The employees interviewed in Germany were:

- various kinds of foremen
- heads of monitoring and control facilities
- various kinds of skilled and semi-skilled workers

Practices

Environmental practices in the workplace

In general, the interviewees knew how their work affected the environment and that they can actively contribute to a less damaging impact.

Some of the interviewees said that the company's increasing concern for the environment meant more work for them, while others found that, while the work had become more complex, there

was not necessarily more of it. It was generally felt that being "green" required more and more training to keep pace with developments.

Shop-floor perceptions of the company's environmental situation

The interviewed workers and foremen are generally positive about the company's environmental situation. They further emphasised this by saying that "their" company did not have any major outstanding pollution problems. Management-set limits were not overstepped, and there were frequent checks: the limits were perceived to be lower than those required by the authorities.

Respondents typically mentioned the following environmental problems in the interviews:

- air pollution and emissions;
- hazardous waste management;
- collection and sorting of paper and other waste;
- internal environmental problems (e.g. dust).

Foremen

Most of the foremen interviewed said that workers often came to them with environment-related questions, some of which would be of a more general nature, while others were about specific situations and/or problems. If they were not able to give an appropriate and/or adequate answer, they invariably knew where to get hold of the information.

Some foremen consider that giving environmental advice and guidance to workers is part of their job, while others experience differences in attitudes higher up in the organisation. At the other extreme, several foremen said that they did not have the time to discuss such things with workers.

Organisational issues

Corporate environmental policy

Workers' knowledge of their company's environmental policy was generally rather poor. Few had any idea of corporate environmental policy and plans. One notable exception, however, was a worker who was very familiar with a concept called "reduce, reuse, eliminate", which he believed to be a major component of the company's environmental policy, and which he also thought was a good "concept".

Environmental information

German workers receive information about the company's environmental initiatives and performance from various sources, including:

- internal newsletters and/or mail;
- the annual environmental report;
- external environmental publications about the company;
- the foreman;

- handbooks;
- personal contacts;
- information from the environment department;
- lectures and meetings;
- information about health, safety and the environment in connection with the installation of new machinery.

When asked whether colleagues could be considered a source of information, many respondents expressed doubt. The same applied to friends and family, even where two family members were employed in two different departments of the same company.

Some workers said that they would like more environment-related information.

Workers' perception of management's attitude and openness to suggestions about environment-related issues

German managers are generally perceived to have a positive attitude to environmental problems and improvements. However, some workers said that, even though they think management takes environmental problems seriously, they do not know how this attitude is put into practice.

When asked whether their own attitude to the environment agreed with management's, various answers were given. Some thought that it did, while others, referring to the lack of information about practice, said they were unable to answer this question properly.

Nearly all respondents in the German companies agree that managers often try to motivate workers to be environmentally responsible. This generally takes the form of limits on effluents and monitoring of the results, in addition to information about the possible environmental consequences of the company's activities. In employees' view, the most important thing is that management clarifies what they are aiming at, what the possible consequences for the environment are, and issues guidelines about how to act in an environmentally correct way.

Most respondents felt that management were receptive to their ideas and suggestions. There were various channels for this communication, e.g.:

- discussing the proposal with colleagues before going to management;
- directly contacting the manager (e.g. foreman);
- going through the normal administrative channels - i.e. first to the department management, from where it could be sent further up the organisation;
- via a "suggestion committee".

Workers knew if they could expect to receive any kind of reward for a good suggestion. Prizes were awarded for, among other things, (i) suggestions which resulted in savings or improved work safety, and (ii) accident prevention. Financial rewards were uncommon in the participating

companies, but other rewards were given, such as promotion, i.e. a new and/or better job in the company, and generally improved social recognition.

Co-operation

None of the persons interviewed in the companies see different educational backgrounds as a barrier to co-operation. On the contrary, the respondents regard this as an advantage in solving practical environmental problems, because it means they all have something different to contribute. A multi-educational and training background was generally considered to be best for solving environmental problems, because people with different skills and experiences can complement each other. However, there was no significant consensus about whether increased environmental performance had led to increased vertical co-operation within the company.

Work and the environment in the future

A majority of the interviewed workers have no doubt that the environment will become an increasing part of their job in the future, and that there will be a need for further environmental knowledge and skills. By and large, they would like to meet these requirements through practically oriented courses - internal as well as external - training, and the exchange of information. They also agreed that more and better information was needed.

The respondents wanted to know more about:

- how to handle new technology;
- relevant information about their own job;
- how to control emissions better;
- the environment in general.

Education and training

The German workers had the following vocational background:

- medium-to-long education (e.g. engineer, mechanical engineer);
- skilled and semi-skilled (e.g. chemical worker, locksmith, plumber, tool-maker).

Some of the interviewed employees felt that their basic education and training gave them a good background for incorporating the environment into their job. It should be noted, however, that many of these have received their training in the chemical industry, where environmental courses are included. In Germany, such training typically combines a relatively strong theoretical basis with practical training. Other workers said that, while they had some environmental background, they relied more on what their foreman said; several explicitly asked for more information.

Environmental courses and training initiatives

Most workers had only participated in formal training activities lasting no more than a couple of days. These include various ad hoc internal lectures or short training seminars, and while these discussed environmental issues, they did not necessarily focus solely on the environment.



There are exceptions, however. One worker, for example, had participated in an environment-related course concerning the environmental consequences of his company's CO₂ emissions. This was a full-time course lasting three weeks, with 48 participants from different companies. There were lectures and visits to companies, so that participants could see how others were tackling the problem. His participation in the course was paid for entirely by the company. Interviewees said that, in order to qualify for such a course, a worker must have been employed in the company for at least a year, so that he/she has at least some basic knowledge to build on. This particular worker was very satisfied with what he had learned at the course, and also thought it would be useful in his daily work (though he would have liked the course to have been a little longer).

As part of their training as foremen, two of the interviewees had participated in a 16-hour long environmental protection course (out of the 560 hours it takes to become a foreman). The course dealt with topics like how to construct a waste disposal ground and the handling of waste water and solid waste. The course was internal and financed by the company. One of the foremen found this course to be too short.

Another worker had participated in two different courses, one of which was an environmental course held during a so-called one-week training leave. The course was financed by the regional ministry of education, and jointly organised by the union. In this worker's opinion, there were too many subjects and there was too little time given to each subject. The other course was a one-week internal course on general environmental problems, e.g. emissions and effluents, where both local and global consequences were discussed. About 10 persons from different parts of the company participated. On the whole, the interviewee found that the knowledge acquired during the course could be more or less directly applied in his daily work.

Another example mentioned by the respondents was a four-day internal course on environmental laws and waste-water techniques. There were about 20 participants from different companies, and the course, which was financed by the company, consisted of lectures, slides, and practical work. Held twice a year, it gave workers a good opportunity to exchange information with colleagues from other companies. The respondent said that he was very satisfied with the course and found the new knowledge he had acquired useful in everyday operations.

Finally, there were several examples of workers who had expressed an interest in and been given the opportunity to participate in short internal courses on environmental protection. However, at least one worker did not think it had much immediate relevance to his everyday work and responsibilities.

Attitudes

Growing interest in the environment

According to most respondents, their companies were doing what they could within the limits of competition and economy, and they were ahead of their competitors. A majority of interviewees were "proud" of their company's record on environmental performance, and several workers and

lower management representatives felt that top management was very open to the public on environmental issues.

Most workers and representatives of lower management were interested in learning more about environmental issues. Reasons varied. One typical reason was the coverage given to climatic changes and forest degradation on television, radio, and in the press. Another general reason was that, as parents, they were concerned about their children's and grandchildren's future. A third reason was that the more knowledge there is about environmental protection the better.

When asked what they would most like to learn more about, interviewees mentioned a variety of topics, including:

- environmental management and protection;
- how to alleviate environmental problems outside work;
- specific, work-related topics;
- what can be done in Germany in general;
- the global perspective;
- current developments in environmental law;
- ground water pollution.

Corporate responsibility

Most respondents thought minimising pollution should be an important corporate objective - as indeed it should for everybody, including employees and private households. On the whole, respondents thought that their company was doing enough, and that companies in general were ahead of legislation in the area.

According to one interviewed employee, reducing and preventing pollution is not only a corporate responsibility but also an opportunity, partly because it is costly to exceed the limits and partly because non-compliance damages the company's reputation, and thus also its sales.

Some argued that the financial burden of costly environmental solutions should be shared equitably between company and government, while others stressed the need for a balance between the environment and the economy.

Some of the interviewed workers would like more information about environmental aspects which could improve the company's overall environmental performance.

Responsibility for the environment

The great majority of workers agreed that everybody has a responsibility for environmental problems, and that everybody, from themselves as consumers and workers, through employers, to various authorities at national and international level, thus has a role to play in solving them.

A few of the interviewees were well aware of the international dimension, but they had different views about this:

- environmental problems must be solved locally, but there should be international guidelines;
- environmental laws should be tightened in the most polluting countries;
- grass-root organisations had made a major contribution to environmental protection.

Some respondents mentioned initiatives they have taken themselves, e.g. buying more environmentally friendly products, even if it meant paying a bit more for them.

Practices in Denmark

The Danish employees interviewed had a wide variety of jobs, including:

- foremen (in various production departments);
- various kinds of skilled and semi-skilled workers (e.g. skilled industrial workers, warehousemen, service mechanics, quality testing, labelling, safety representatives, painters, truck drivers, electricians, repair work).

Practices

Environmental practices in the workplace

Typical environmental problems connected with the respondent's job were:

- packaging;
- more careful handling of raw materials and products in storage.

Several of the respondents asserted that their company was already doing everything possible for the environment - and that it had all been documented in connection with environmental certification.

The following activities were typically mentioned as causing less damage to the environment:

- better use of resources, both through recycling and the sorting of returned goods/waste, including packaging and plastic waste;
- substitution of environmentally hazardous substances, etc.

There tends to be a strong relationship between type of job and the degree to which workers think that their work has a direct influence on the environment.

The typical attitude among workers and foremen is that growing corporate environmental concern means extra work for them, e.g. the extra time required "to do something right the first time", or to deal with problems that have cropped up in connection with environmental initiatives. A few said that this extra workload was only a problem in the beginning, though others claimed that part

of the problem was just plain resistance to change. People prefer to keep things as easy as possible, they explained.

Shop-floor perceptions of the company's environmental situation

On the whole, most workers thought that "their" company was making a considerable effort to improve the environment, e.g. by using less dangerous raw materials whenever possible. The situation in their workplace had especially improved during the last 5-10 years, and several workers stated directly that they were proud to be working in a company which has such a high environmental record.

Generally speaking, workers who said that their workplace did not have any major environmental problems did not have any detailed knowledge about the company's environmental situation.

When asked about the company's external environmental problems, the following were mentioned:

- residual substances (organic solvents) in production;
- energy consumption;
- packaging (amount, sorting);
- emissions.

A typical example of solutions to environmental problems which go beyond mere pollution abatement, is in waste collection and separation. Thus, one Danish multinational company has developed a colour system to make it easier for workers to sort waste. Hazardous waste is sent to a central chemical disposal plant.

Another company has introduced a scheme to take back used products from its customers. The products are then disassembled, sorted, and the materials reused and/or recycled. Other positive examples mentioned include the substitution of products that are a risk to the environment and/or workers.

During the interviews, a number of suggestions were made on how further improvements to the environment could be carried out, including:

- setting priorities;
- the use of log books;
- allowing the department which suggested the improvement to keep any savings made;
- taking a long-term perspective;
- more acceptance of the fact that new procedures take extra time.

Workers also mentioned problems related to the internal environment (smell, noise, health problems, repetitive jobs).



Foremen

When asked whether the environment created problems for them, foremen typically replied that there were no problems, and that if there were, they would not be greater than in any other area. Some did admit, however, that change always brings problems.

Most foremen said that workers often came to them with environment-related questions, e.g. where to put this waste, or which safety procedure to follow. The majority also felt a responsibility for some aspects of the environment, but in most cases it was not a formal responsibility. Several foremen remarked that they did a lot to motivate workers by repeatedly telling them that, for example, it mattered to collect and sort waste. However, others maintained that they lacked the time, money, information or technology to fulfil their environmental "responsibilities" more optimally.

One representative of lower management working on production planning observed that, in his case, many things were focused on and judged by numerical values. It was therefore considered difficult to combine both responsibility for production and thinking up new environmental improvements.

Organisational issues

Environmental policy

While some workers and representatives of lower management (particularly in environmentally certified companies) knew that the company had an environmental policy, few were able to describe it in their own words, in as much as they often only had a vague idea of what it involved. A typical response was that it was about noise limits, environmental norms and goals, compliance with rules and regulations, and savings of all kinds.

Nevertheless, a few respondents could describe the specific environmental goals of their own department, e.g. goals for waste reduction and water use, while in other cases, workers only knew where to read/learn more about them.

Environmental information

Workers had access to environmental information from the following sources:

- newsletters;
- notice boards;
- meetings;
- foremen and shop stewards and safety representatives;
- computer network;
- environmental handbooks;
- videos;
- annual reports.

There was some dissatisfaction with companies' information systems, e.g. several employees complained that new environmental activities were sometimes implemented without their knowledge.

There was no general agreement among the respondents about the quality of the information system. Some complained that they only got information if they sought it themselves, while others found this acceptable. There was wide agreement that more information would be welcome, however.

Workers' perception of management's attitude and openness to suggestions about environment-related issues

Many workers and representatives of lower management felt that cost was often a major obstacle to environmental improvements, though most respondents thought that top management generally had a positive attitude. In environmentally certified companies, management was generally perceived to be more positive towards environmental improvements even if they were costly, and more willing to disclose information if something went wrong (e.g. an accident). Most of the interviewed employees felt that their environmental views more or less agreed with management's.

Some workers remarked that they were directly encouraged to think about the environment in their everyday work, while others said that they were only indirectly encouraged or not encouraged at all. One explanation given for this was lack of information. Another was that foremen were not always aware of their role as 'exemplars' to blue-collar workers.

Though few companies had a formal system of economic incentives, even small rewards, such as an environment-friendly T-shirt in an internal contest, were highly appreciated by workers - it even became a sport to win one. Apart from this, opinions about economic incentives were varied. Some thought they were necessary, while others believed that caring about the environment should be a natural part of the job, because, as one worker said, who can measure the value of a good idea? This view tended to be slightly more prevalent than the former; few pointed out that most people work primarily to make a living, however.

In a couple of companies, the bonus system for lower management included environmental performance. Several of the interviewed foremen pointed out that such systems could lead to conflicts, both between workers and foremen and between foremen themselves.

Suggestions from the shop floor could be made in a variety of ways, e.g.:

- via suggestion boxes;
- at meetings;
- through foremen.

According to the respondents, they were motivated by the actions of higher-level managers and foremen. One employee mentioned that a conducive atmosphere to discussion is a good motivation. In companies where management was perceived to have a strong interest in the environment, and where they tried to motivate their employees, workers generally felt that they also translated their 'fine' words into practical actions.

Several workers thought that new and environmentally-friendly habits were likely to influence overall behaviour. For example, workers who become more efficient at sorting wastes or using water and/or electricity tend to "import" this "habit" to their own homes.

Co-operation

Although there does not seem to be any significant change in the way workers co-operate as a result of increasing environmental activities (compared with earlier), some at least indicated that they could see the need for closer co-operation. Thus, there were signs of improvement in both horizontal and vertical co-operation in the organisation, e.g. (i) different qualifications were seen as an advantage, (ii) environmental problems were acknowledged to concern everybody, and (iii) many departments felt that they would have to work together.

The strongest indications of change in the way employees co-operated within and across departments were found in some of the certified Danish companies, though these companies also tended to have the flattest organisational structure. Changes included more understanding and recognition of the various functions and key persons in the overall process. These companies also tended to have a stronger focus on training, often in mixed groups, i.e. with participants from different departments and organisational functions. Such courses were generally very positively received by employees in these companies.

The environment as part of the job in the future

A considerable number of respondents thought that the environment would loom larger in their job in the future. Among the reasons given for this were: (i) the use of more environment-friendly materials and chemicals; (ii) better, less environmentally harmful use of machinery (which in turn demands better operation practices); (iii) increasing demands from the authorities; (iv) developments in technology, which will make continuous environmental improvements possible; and (v) the constant need for new products and new thinking about the environment.

The great majority of employees interviewed said that there was a need to be better prepared (i.e. more information and more knowledge) for the future, when the environment would be a much more important factor than it is today. Opinions differed as to how this could be accomplished, however. Suggestions included:

- meetings;
- internal and/or external courses;
- ad hoc groups.

Several respondents argued that, (i) ideally, such information should be (task)specific. Otherwise it could easily end up being a waste of time, (ii) foremen must remember that workers are quite capable of thinking for themselves, and (iii) training is a very important means of communicating information. Some workers preferred courses, because they often provide an opportunity to discuss things with people from other departments and/or industries, and this was preferable to just reading about it. Others suggested that there ought to be a compulsory environmental course for all employees, because not everybody had a positive attitude to the environment.

Education and training

All respondents had been in their respective jobs relatively long (between 2 and 18 years). Their educational and training backgrounds were:

- various kinds of semi-skilled workers (basic vocational training, i.e. a primary and lower secondary school education, in one case supplemented with basic vocational courses in food science, basic commercial and secretarial courses, fisherman, locksmith);
- various kinds of skilled workers (e.g. trade and commerce, automechanic, engineer/mechanical engineer, painter, electrician, fitter, baker);
- medium- to long-term education (e.g. commercial correspondent and office trainee, office clerk, computers, basic diploma in business and commerce, computer assistant, engineer).

Few interviewees had received any environment-related education and/or training during their basic education and vocational training, mostly because the environment was not an issue at the time they received their education.

A small number of respondents had learned something about the environment through courses or projects in their present or former job. Participation in safety steward courses was also mentioned as a way of learning about the environment.

Environmental courses and training initiatives

Some of the Danish companies in this study were BS7750 (DS/INF 75) certified, and a number of courses, projects and information meetings had therefore been held in connection with the certification process in these companies. Typical issues discussed at such courses were:

- how to start the certification process;
- how to draw up a plan of action leading to environmental certification;
- what is required to obtain certification;
- how to keep it;
- the necessity of co-operation.

Some of these courses involved group work, with participants from different departments, including administration and production. On the whole, employees found such courses valuable, though not equally easy to implement in their everyday work.



Other interviewees had participated in courses or seminars where the external environment was only briefly mentioned, e.g. courses on the working environment, different types of raw materials, and quality awareness.

In one BS7750-certified SME, management had adopted an internal and continuous training approach based on regular meetings/seminars/lectures for both workers and foremen, or just workers alone in separate groups, typically 6-13 workers per time. Respondents had participated in such training 4-10 times. The environment manager was assisted by an external consultant, and courses were tailored to individual jobs and departments. The topics discussed at these meetings included:

- the company's environmental activities;
- reductions in energy consumption;
- waste handling (sorting and/or recycling).

In connection with the meetings, so-called "green groups" had been formed in each department to discuss environmental problems. One problem pointed to by a couple of the employees interviewed was that the language used - for example, in the environmental handbook - was in some cases difficult to understand.

In another quality and environmentally certified company, employees were sent on a one-week training course, where they were taught in small, mixed groups (e.g. sales and production people). This was a more typical approach of the companies included in this study. The methods used at this internal training course varied between lectures, group work and case studies. Issues discussed ranged from how to improve the physical and psychological working environment to how to minimise the effect on the external environment. Employees had both good and bad things to say about the course. Some said that it would have been better if the course had been more practical- and interdepartmental-oriented. Here, too, the language - both spoken and written - was criticised as being hard to understand. Frequent interruptions were necessary to clarify some point or other.

Attitudes

Growing interest

The reasons given for wanting to know more about the environment ranged from deep personal interest to just wanting to keep up to date about developments in the area.

When asked to be more specific, respondents typically mentioned the following: (i) job-related topics (air and water pollution, energy consumption, the product life cycle, waste management, availability of substitute products, new materials, place of origin of raw materials, etc.); and (ii) general environmental topics (the scale of the problem, individuals' own influence on the environment, how to help prevent environmental disasters, farmers' use of chemicals and

fertilisers, what the authorities do with figures on emissions, why do different kinds of plastic act differently, the environmental effect of products after they leave the company, etc.).

It was pointed out that it might be difficult to motivate all workers. Some would probably not have the time, or feel that it would use up too much of their 'precious' leisure time, while others might prefer to learn things that were more job-/career-related.

Several foremen commented that some workers just had a "wrong" environmental attitude; in other words, they did not care about the environment, or they thought that it was not their responsibility.

Shop-floor perceptions of environmental responsibility

Nearly all the respondents agreed that more needed to be done to improve the environment in general. Although few doubted that environmental problems were real, many were sceptical about the proposed solutions.

Again, nearly all respondents emphasised that everybody had responsibility for the environmental situation, regardless of function. Since we have all created the problem, the argument goes, then we should all contribute to solving it. Local and national governments, the EU, and the UN were also mentioned, however. Most of those who mentioned the government seemed to feel that local government had a major responsibility, and although several stressed the need for joint efforts, there was generally not much confidence in the outcome.

When asked about the environmental roles and/or responsibilities of society, a variety of answers were given, including:

- environmental regulators must decide which changes are needed;
- society needs environmental regulation in cases where self-regulation fails;
- regulators should have a catalysing and supporting role;
- environmental initiatives should also motivate the general public;
- there should be easy access to relevant environmental information (both for industry and individuals), e.g. about how to behave in a more environment-friendly way.

The problem mentioned most frequently in relation to the environment and society was waste. Many respondents are worried about waste dumps and the export of waste across borders. Both the government and international organisations in general were expected to prevent this.

Respondents also thought that consumers should be aware of the amount and type of packaging of the products they bought, and that there was too much junk mail. Households should do more than just sort waste, e.g. more recycling and reuse of products was needed, even though Danes already do a lot in this area.

There were several suggestions for corporate management to introduce their own environmental initiatives, i.e. adopt a proactive attitude. Since they were responsible for their own pollution, they should be the ones to clean it up again. Companies could make a greater effort than they had done so far. But even though management was responsible, employees could still make suggestions.

Finally, one respondent commented that researchers should think more about the effect of their work on society and the environment.

Conclusion: characteristics of operational initiatives and training practice requirements

In addition to the information reported in the previous sections obtained during the interviews with representatives from various companies, the conclusions also draw on the questionnaire survey carried out among a larger group of Danish workers.

Most of the interviewed persons were well aware of the key environmental issues related to their own jobs, and often acknowledged that what they did had a direct effect on the environment. The environmental problems they mentioned were either job-related or issue-related, e.g. emission and wastes. This general situation was reflected in the questionnaire survey as well. But concerning the specific environmental consequences, it was surprising to realise that almost 10% of the surveyed respondents were not able to say if their job activity resulted in toxic waste or waste water. Less surprising perhaps, skilled workers and those who had attended courses in environmental issues were more able to specify environmental consequences related to their job.

On the whole, the workers interviewed (both in Germany and Denmark) were satisfied with the environmental record of 'their' company, and typically thought that management did whatever was possible within the practical limits of competition. Most employees felt that management had a positive attitude to the environment, and that managers' attitudes were similar to their own. However, German workers in particular seemed to know less about management's attitudes to the environment, which probably has something to do with the size of the German companies concerned. Quite a few workers and representatives of lower management gave a strong impression of being proud to work in a company which was perceived to be at the forefront of the industry. This tends to 'correlate' with the degree of environmental progressiveness of the company, i.e. the greater its environmental reputation, the more employees indicated that they were proud to be a 'member of the team'. This often resulted in their becoming unintentional 'corporate ambassadors' to the public, friends, etc.

Workers and lower managers generally felt that management was receptive to suggestions, although there tended to be differences in how suggestions 'fared' in the visited companies.

Unlike TEM 1, no major economic incentive schemes were reported in the companies visited, and respondents did not seem to have any strong preferences for either incentive schemes or alternative ones.

In the large companies included in this study, which had multiple organisational hierarchies, the environmental role of lower management, e.g. foremen, was that of resource person or guide, to whom workers could go with their questions on an ad hoc basis. There was occasionally felt the lack of a more precise, or formalised, environmental responsibility, however.

Most of the interviewed employees, regardless of position or nationality, knew little or nothing about the company's corporate policy, except, in some cases, that it did have one. Only in a few Danish SMEs did workers and lower management have any detailed knowledge of their company's corporate environmental policy and plans. These companies also happened to be BS 7750 certified. The general tendency was confirmed by the questionnaire survey.

Respondents in the surveyed companies received environmental information through various channels, both internal and external, though with no significant pattern. Employees often commented on the need for more information.

In the questionnaire survey, it turned out that safety representatives are the main source of information on environmental initiatives in a company. Other important sources are shop stewards, meetings or written information, whereas managers and especially colleagues have a low position. Respondents who have attended courses on environmental issues tend to receive more information compared to others.

Sources of information concerning environmental issues in general include newspapers, electronic media and the union. Again colleagues as well as friends and the company are all evaluated to be at a low level. It is quite interesting to find out that there seems to be a dividing tendency between the respondents: some only seek information in relation to their job, whereas others have interest in more general information.

Opinions differed as to whether increasing management concern for the environment had resulted in more work or whether it had substantially changed the existing level and structure of both vertical and horizontal co-operation. Despite this, all interviewed employees agreed that the environmental component of their jobs could be expected to increase in the future.

The majority of employees had not participated in any formal environmental training lasting longer than a couple of days, though a few BS 7750-certified companies had introduced more continuous training activities.

Current environmental training is both internal and external, and ranges from specialised to general environmental awareness courses. Workers generally appreciated such courses, though almost all wanted them to be longer. German workers, in particular, had a strong interest in environmental issues outside the job. Danish workers tended to be more concerned about whether training courses were job-relevant. When asked to suggest how environmental training could be improved, some differences - especially among Danish workers - appeared. Typically, younger and more educated workers wanted to be recognised as individuals, capable of 'thinking for




themselves'. At the other extreme, semi-skilled workers indicated difficulties in understanding what was written in the corporate environmental handbook of BS 7750 certified companies.

In the questionnaire survey, the respondents were asked how knowledge about environmental issues should be supplied. The general response to this question seemed at a first analysis to be: Everywhere except in leisure time. But three main groups could be identified behind this general response: (i) basic school education and vocational training, (ii) general labour market courses, and (iii) dedicated courses. An obvious conclusion seems to be that at the moment dedicated courses will be the most efficient source of knowledge whereas environmental issues in the long run must be incorporated as a natural component of the basic training.

In addition to industry's (both employers and employees) responsibility towards the environment, workers in both countries also pointed to their role as consumers, i.e. everybody has a responsibility towards the environment.

The respondents in the questionnaire survey found that all stakeholders mentioned were responsible for keeping environmental problems to a minimum. But it is possible to separate respondents into a group which mainly points to individuals themselves as responsible and another group which points to representatives in public bodies or companies. It seems as if especially skilled workers and those who have attended several courses have a more diversified view of the complexity of environmental problems and are aware that individuals play an important role both on their own and as consumers.

Apart from financial limitations to environmental improvements, a few workers also remarked that some of their colleagues were resistant to the very idea of change.



Examples of operational environmental management practice

Introduction

The following four typical examples illustrate the environmental-management-related training activities of the companies visited. The first example, a multinational company, describes employees' environmental training from the point of view of those responsible for it. The remaining examples describe the environmental situation and initiatives in the companies concerned from employees' point of view. In examples two and three, some of the employees interviewed had participated in a course designed jointly by the company and the local vocational training centre. The last example is of a company which only offers employees short, internal training courses.

Examples

Environmental training from the company's point of view

This is a large, multinational company in the chemical sector, with approximately 42,000 employees in more than 160 countries. Employees work 12-hour shifts. The company applies the same environmental standards worldwide, believing that different standards in different countries would erode its image. The headquarters of the company is located in the middle of a major city, which makes it extremely sensitive to local opinion. Safety and the environment, which have always been key issues in this company, are inextricably linked. The first "treatment plant" was planned in the sixties and built in 1974. Environmental training became a major service in the early eighties, gradually developing into what it is today.

The company has a permanent emergency task force. An internal investigation is carried out within two weeks of an accident to determine what caused it, find out whether the employees



involved are qualified to perform their tasks, and suggest improvements, etc. The general results of such investigations are communicated to the rest of the company.

All employees at a given site in this corporation can be held personally responsible for the environmental effects of their work according to national legislation, but the company regards it as a duty to protect its employees from doing anything illegal by training them and giving them proper instructions. Thus, managers are expected to give all employees the necessary information and training to enable them to carry out their job properly. The personal responsibilities of each employee are outlined in a manual.

The company has a committee of shop stewards, which has set up various sub-committees responsible for such areas as environmental protection, the working environment, new technology, etc. The sub-committee for environmental protection, which was set up in 1987, is today merged with that for the working environment. All environmental and safety courses and modules are compulsory for works managers trained internally in the company. In addition, works managers must attend a half-day information meeting once a year, as well as 3-4 meetings a year with someone from the company's environment department to ensure consistency in the information passed on to employees. Works managers are responsible for the training of their employees both with regard to motivation and actual teaching in different forms. In this, they are supported by the training department.

Environmental awareness is perceived to be high, although some employees are far from committed. Every five years, the company carries out an employee opinion poll. The result of a recent internal survey shows a high degree of sensitivity among employees concerning safety and the environment.

All employees are kept up to date on important new developments and research results in the area of safety and the environment. Management differentiates their written information according to three main groups: (i) top management, (ii) middle management, and (iii) blue-collar workers/shop-floor employees.

The company is legally obliged to continuously educate its employees, including the environment manager. The policies and principles of the internal education system were formulated in 1993, and management is currently in the process of implementing these. The training and education of each employee must be specified in terms of their basic education, specific tasks, and future job for a period of 5-8 years. Environmental courses are targeted to the same three main groups as written information. The company is still in the process of developing and implementing the internal education system with a top-down approach, however.

All employees with a university or similar education attend basic seminars on the company and its policies. Safety and the environment are a compulsory part of these seminars, since, according to management, it is not taught sufficiently at universities. The focus is on goals, tasks, and demands. Shift workers who have not been trained in the company are given an introductory

course in safety and the environment within the first year. Semi-skilled workers are put in charge of a more experienced person, who acts as supervisor. This system is expected to be expanded in the future.

Training is based on three main principles: (i) target-group-oriented training; (ii) knowing your contact persons, e.g. in the training department; and (iii) exchange of practical experience. This is both to save time and money and to ensure that employees only acquire relevant information. The transfer of knowledge is believed to be a goal in itself, and is applied on a global scale by means of co-ordinating meetings. The importance of continuous education is fully recognised by management, who consider it essential that all employees understand more about their jobs, i.e. the possible consequences of mistakes, etc.

In the course of developing a training course, workshops are held for certain target groups in order to identify the most important issues. Via a feedback mechanism, the course is further developed to ensure optimal modification and implementation.

Topics can include:

- internal and external (national and international) regulations;
- social demands;
- sustainable development;
- customer information and advice;
- environmental product information;
- future demands;
- job-related issues;
- where to get information and support.

The teaching approaches used are:

- lectures;
- case studies;
- group work;
- exchange of experience.

Experienced employees act as co-teachers.

There are only a limited number of courses on the environment for unskilled and semi-skilled workers, though the common internal training programme also includes environmental courses. Shop stewards would like improved possibilities for all employees to participate in a safety and environment course lasting at least one week. On the whole, employees have a strong interest in these subjects.

There is an acknowledged need for courses capable of imparting common environmental knowledge combined with company-specific aspects. Ideally, each employee should be able to assess the environmental consequences of changing a parameter in a given procedure.

The focus of the training department is primarily on the education and training of the company's own employees, but it is currently considering offering the same training to external suppliers and customers. It is recognised, however, that its training programme must be fully developed first. Likewise, the local union is also concerned with the environment, and has made a joint proposal with the industry for a training course which includes environmental aspects.

The company sees the role of educational institutions in connection with more corporate environment-friendly behaviour as:

- enabling employees to carry out their jobs in an environmentally safe and legally correct way;
- motivating employees by demonstrating that what they are taught can be used in the problem-solving process.

With regard to the future, the company hopes to involve employees much more in the development of further education and training courses, and thereby satisfy their requests for short input sessions, more case studies, group work and role plays, and less plenary sessions/lectures. It is also hoped that future legislation and regulations will be simpler to communicate, making it easier for employees to understand and remember it.

Each central function of the company, e.g. environment, safety, further education, social services, etc., has a responsible middle manager. The tasks of these managers are decentralised throughout the company, however, creating important personnel networks which can be used to provide information, solutions, etc. Personnel networks are unbureaucratic and fast, and multiply as a result of the training courses, where employees get to know each other and their contact person in the training department.

It is generally acknowledged that employee concern for the environment requires the unambiguous and continuous commitment of top management.

An internal Green Campaign Strategy

This company is a family-owned, world-leading toy manufacturer, which unfortunately does not publish any accurate information on key economic figures. We estimate total sales to be in the region of USD 1 bn, and the total number of employees to be approximately 7,000 worldwide.

The company's "greening process" started to gather speed a few years ago, after the introduction of an internal "green wave campaign" (GWC). This is not to say that the company had ignored the environment before - but, being a manufacturer in one of the world's most environmentally regulated countries, and having important market shares in the US and Germany, the company had

long felt a growing need to strengthen the environmental dimension of their products. For example, they have been "forced" to change the chemical composition of their basic product material (plastics).

The company began making serious environmental efforts at the beginning of the 1990s. The first major step was to make sure that everyone feels responsible and supports environmental management. The employee motivation programme, which started with a major information campaign in all subsidiaries simultaneously, was initiated and supported by the CEO, together with the owner of the company. The campaign took the form of a competition to identify environmental problems and ideas. Employees showed great interest in the competition, and about 1000 ideas were submitted. Every employee who came up with a good idea received an environment-friendly T-shirt. The following criteria were used in picking the winners: visibility, effectiveness, practicability and originality. There were three winners, each of whom won a money prize to be spent on travel or environment-friendly goods. Later on, the focus was changed to specific environmental issues, e.g. waste and packaging.

Employees were generally positive about the company's environmental performance, they tend to realise that the "right" developments are taking place, and that the company is trying to set an example to others. Thus, nearly all the interviewed employees knew that the company had an environmental policy, though only a few could state what it was. They also knew that information on environmental issues occasionally appears in the internal newsletter and magazine. Other sources of information mentioned were: the environmental handbook; an industry magazine about packaging; meetings for safety representatives; a video about the company's environmental record; registration of waste; and the foreman.

Generally speaking, the employees interviewed think that management has a very positive attitude to environmental improvements, that they motivate employees to think about the environment, and are receptive to suggestions. Management information and support is considered to be important. There are no demarcation disputes between employees from different trades and different positions in the company hierarchy. On the contrary, many employees say that it is an advantage. Employees had no strong preferences for monetary bonuses or other alternatives.

Employees know that the company has introduced various initiatives to improve environmental performance. These initiatives were either ones that the employees have been involved in themselves or ones they have heard of elsewhere in the company. They include (i) a more efficient use of resources, and (ii) more efficient waste management and reduction. Likewise, the company carried out a survey of employees' transport habits to and from work at a number of its factories, and published the names of those willing or able to join a car pool in an internal newsletter.



On the other hand, employees said that some problems remained:

- more hazardous substances should be substituted;
- emissions are still too high;
- there is still too much waste;

They also had some suggestions for improvements:

- selling some waste products;
- the collection of cleaning fluid;
- switching off the light, e.g. in the middle of the day in corridors.

Together with a consultancy firm, the company has developed an internal environmental course for departments which carry out environmental audits. The course, which is held prior to the audit, lasts two days, and involves quantity, effect and diffusion, as well as both general and specific aspects. So far, there have been four courses, attended by about 15-20 employees from different departments and levels. The course is held outside the company, and includes the following topics:

- what is the environment, and what does the word environment mean? Group work and plenary discussions.
- management's attitude to the environment; environmental audits; the company's environmental policies and strategies;
- environmental problems - a global challenge;
- the principles of environmental management;
- an example of an environmental audit (slides);
- group work: participants are divided into three groups and work on problems in three different companies close to where the course takes place. This is followed by discussions of the group work;
- an environmental audit in another company, presented by someone from that company;
- a case video and the group work on it;
- planning environmental audits in the company.

Employees also participate in other courses with an environmental content, e.g.:

- the annual foreman seminar;
- the so-called §9 course (as defined by Danish environmental protection legislation) on the working environment;
- a course on different types of plastics;
- a quality course.

According to the environment manager, management will soon be able to offer two other environmental courses. One, for salaried employees, project leaders, buyers and logistic personnel, will be a two-day course, based on a company game about the environment. The other

course is for hourly-paid workers. This will be a three-day course on environmental awareness, which the company has developed jointly with the local vocational training centre.

Knowledge about the environment is not a job requirement for new employees. Instead, the company tries to make them aware of the environment. All new employees are given some general information about environmental issues when they join the company.

Involve employees in the environmental certification process

This is a subsidiary of a foreign, multinational company. The company, which has about 150 employees, is BS7750 certified. The certification process was initiated at a meeting to discuss the project involving about 25% of the workforce. Shortly after, middle and top management took over the running of the project, formulating its environmental goals and objectives and introducing them to employees through, for example, courses.

Management has tried both to create a culture based on what is described as honesty in all aspects and to make the environment an integral part of decision-making. Environmental initiatives primarily build on common sense and rules of thumb. In one such initiative, the production manager set up an employee group for the purpose of reducing chemical wastes. This turned out to be a success, reducing chemical wastes by 50%.

The company's environmental performance has greatly improved over the past 10 years, especially in the last 3-4 years, when additional improvements have been made in connection with the certification process. Environmental certification meant that goals, etc., were written down, thereby guaranteeing, according to some of the respondents, that further improvements will be made in the future.

The company reports to its parent company once a month about matters concerning both the internal and external environment. A full report of any accident that has occurred is sent to the parent company within 24 hours.

There is a general agreement among the respondents that the company's most serious problems are water consumption, waste water, environmentally hazardous raw materials, and emissions. Most respondents think that improvements are made on a continuous basis, however; e.g. some waste water is circulated in a closed system, thereby avoiding the discharge of hazardous substances into the municipal purification facilities. Other, more toxic, waste water is stored in barrels and sent to a central destruction facility.

At the time of the interviews, one department had started a water consumption project. Through weekly meetings, where things are discussed, suggestions made and priorities set, everybody in the department is involved in the project. The company has also published a mass balance, and is sorting packaging and recycling or reusing as much as possible. The possibilities for the further use of packaging is currently being examined. One problem is that, as yet, it is not possible to clean plastic packaging.



Most respondents are familiar with corporate environmental policy - only one employee admitted not knowing anything about it. Some workers even had very detailed knowledge of the company's environmental policy and overall objectives, especially those of their own department, including the projects set up to fulfil them. This knowledge increased during the certification process, probably because employees were involved in setting the goals for their own department and making them a reality.

Employees are informed about, for example, departments' environmental goals via an electronic information system. Other channels of information include meetings - either for the entire workforce, for each department, or for department managers - notice boards, internal newsletters, e-mail, daily contact, brief presentations, and courses. The internal information system is to be further elaborated in the near future, i.e. become more formalised and visible.

The respondents stated that the company had good external relations with the environmental authorities as well as the company's immediate neighbours. The latter receive general information about the company, including environmental information, once a year, and they are also kept fully informed about accidents.

The general impression is that management has a positive attitude to the environment, although only a few employees said they were directly motivated by management to consider the environment in their everyday work. On the other hand, most respondents claimed to be indirectly motivated by management's own example and by the amount of resources allocated to environment-related projects.

On the whole, respondents found management open to suggestions. There are various channels for this, e.g. suggestion boxes, and all suggestions are followed up, with prizes being given for the "best" ones. These can be monetary prizes or gifts, depending on the outcome. Some suggestions are too costly to realise, however.

One worker explicitly stated that he felt many of his colleagues were unhappy about the changes following BS7750 certification. Many employees have no interest whatsoever in courses, and for some, work is only a way of making a living, which he thinks is a shame. This tended to put a damper on further environmental initiatives.

The company has developed an environmental course in collaboration with the local vocational training centre. All employees have participated in the course, which focuses on the visualisation and conceptualisation of the environment. The company has plans to incorporate the environment into the internal training and education programme, together with quality and safety aspects. In general, the company considers internal courses to be superior to external ones, among other things because they have a specific focus, internal teachers, and a hands-on approach.

All employees, from administration to production, are given a two-day environmental course, where participants come from all departments and levels. Held in connection with BS7750

certification, the course gave participants an idea of what is required to obtain and keep certification, and how to draw up action plans, etc. The course consisted of both lectures and group work.

The general opinion of the course was positive - some found they could use it directly in their work, while others said they could use it indirectly. By indirectly was meant, for example, that they know where to go for information, that they think more about the various aspects, that it motivated them, and that they were taught how to use various tools.

A continuous learning approach

Founded at the beginning of the 1980s, this is an SME with about 100 employees and another 100 in closely related companies. From the start, the company had a reputation for producing high quality products, and in the second half of the 1980s it also established a reputation for environment-friendly products and production methods. The company, which is both BS7750 certified and registered under EMAS, has received several awards for its efforts on behalf of the environment.

Respondents were unanimous in saying that management had a positive attitude to the environment, and that the managers were open to suggestions from employees. The environment manager in particular was said to encourage employees to consider the environment.

The company's environmental policy is based on a cradle-to-grave philosophy in which products are rated on a scale from "environmentally worst product" to "totally green product". While management realises that it is impossible to manufacture a "totally green product", it's policy to improve the standard every year.

Several employees knew the company's environmental policy by heart, because during the BS7750 certification process they might have been questioned about it by the auditors. In general, however, all employees know something. For example, some knew that the company wants to save 10% on electricity in the coming year, that it wants to be a toxic-free business, and that its goal is to be environmentally competitive.

Respondents were generally satisfied with the information they received on environmental matters, and especially satisfied with the environmental handbook. Apart from this and the occasional bulletin on the notice board, however, they do not receive much written information. Information is primarily distributed at meetings (for everybody, or for selected groups), talks, and in audits. The environment manager is seen to have an important role in the communication process, and workers acknowledge that he is doing a good job. Some even commented that they can use what they have learned at home.

Several respondents had experienced an improvement in interdepartmental co-operation as a result of the BS7750 certification process, due to the greater degree of communication this



required. Workers were split over the question of environmental-performance-related wages, however.

Employees knew of various initiatives which the company has taken to improve environmental performance:

- sorting waste - this is now almost routine;
- some waste is being recycled;
- improvement of air quality inside the building;
- energy savings - switching off machines when not in use;
lights - gradually replacing old bulbs with low-voltage bulbs, and using foil in the lamps to increase the light intensity;
- the use of as many environment-friendly materials in production as possible, e.g. materials which do not contain hazardous chemicals, formaldehyde, and heavy metals;
- cutting back on unnecessary photocopying;
- noise reduction;
- psychological and physical improvements in the working environment.


With regard to the education and training of employees in environmental issues, this company has taken a different approach to the other companies in the study.

The company holds one hour internal courses/meetings about once a week. Participants include the environment manager, occasionally an external consultant, and several employees (6-13), who work together on environmental problems in the department, a certain type of work, etc. Each employee participates in 3-10 courses/meetings. This increased dramatically in connection with BS7750 certification, and is also expected to increase again in connection with EMAS registration. The following topics are discussed:

- reduction in energy consumption, and the sorting and recycling of waste;
- environmental consequences of a specific job/department;
- the environmental handbook;
- the company's environmental activities and plans.

The meetings/courses generally start with a briefing by the environment manager, followed by discussions. All the employees interviewed had a high opinion of the meetings/courses, and some said they could use what they learned directly in their work. The environment manager in particular was praised for his efforts and his way of communicating. But a few employees mentioned that it would make things easier if the more "technical terms" - both in the discussions, but especially in the environmental handbook - were "translated" into "everyday language".

Most respondents think that their jobs will have an even greater environmental content in the future.



Environmental education and vocational training initiatives - an overview

Training in environmental management

As an introduction to the sections on state-of-the-art environmental and vocational training in Germany and Denmark, a brief outline of the situation in other parts of the EU, including typical examples, will be given. However, as mentioned in the introduction, the material received was generally not very extensive.

Finland

In Finland, the national curricula for secondary and tertiary level vocational training and tertiary level technical education are currently under revision. The main aim of the new curricula is to incorporate the environmental dimension as an integral part of vocational competence.

AEL (Centre for Technical Training) is the largest provider of environmental technology and management training in Finland. Most of their courses are aimed at lower management, and skilled and semi-skilled workers. The Centre offers a variety of short (2-10 days) environmental technology courses, e.g. water treatment and control of chemicals, reuse and recycling of waste, life cycle analysis, environmental auditing and environmental impact assessment in industrial projects, environmental risk assessment.

Sweden

In Sweden, the Swedish Environmental Agency has developed a number of special environmental education courses, some specifically for vocational colleges, e.g. car repair courses.

The Federation of Swedish Industries has published a set of environmental management recommendations for industry, which includes an environmental training programme for workers.

Individual industries are responsible for training their own employees in good environmental practice. A special introductory course has, for example, been produced by the Federation of Swedish Industries for this purpose.

Belgium

In Belgium, ABVV (Algemeen Belgisch Vakverbond) has written a manual for the environmental education of workers, and has also recently introduced new training initiatives for middle managers (in the planning stage at the time of this study).

"Arbeid & Milieu" (Labour & Environment) is another Belgian organisation committed to sustainable development. Its board of management includes representatives from both the trade unions and environmental organisations. Activities are channelled into three areas: (1) dialogue and consultation, (2) research and consultation, and (3) awareness and information. Arbeid & Milieu has developed a "Syndical Audit System" (an instrument for evaluating a company's environmental policy) for union workers in the graphic industry. The system is based on a questionnaire, which rates companies on a scale from "very bad" to "very good". Workers learn to use the system in educational sessions.

Luxembourg

The Centre de Formation Professionnelle Continue Ettelbruck in Luxembourg offers short ad hoc courses on the environment. The courses primarily focus on general environmental issues, e.g. environmental protection, recycling, and environmental management.

Ireland

Here, too, the focus has been on traditional environmental technology issues. A strategy has recently been developed for a water quality management system. The strategy consists of 5 stages, the first of which is an integrated training package for employees in water and waste water schemes. The course for stage one has been designed as a series of 6 modules: (i) Water Treatment, (ii) Sewage Treatment, (iii) Distribution Systems, (iv) Plant Maintenance, (v) Safety, and (vi) Quality Systems. Each module contains a number of sub-units. The material can either be used as a complete course lasting 8 days, or as individual modules. This first stage was tested in May 1994 on a pilot scale.

According to the Ministry of Education, Culture and Science, no information on the environment dimension in vocational education is currently available because this is the first year it has been included in the basic curriculum. It is expected to be some time before all vocational colleges have implemented the new curriculum.

The Netherlands

Training programmes aimed at specific target groups are typically developed by private institutes, which can tailor courses precisely to industry needs.

The UK

Many of the vocational training institutions in the United Kingdom have adopted a broader approach to environmental issues including courses like, e.g.: What does the environment mean to you?; The green revolution; The challenge to trade unionists; The challenge to industry; Transport issues; Food and consumer issues; Energy - production, use & the environment; Chemicals and the environment; Getting things done at work; Defending your community and doing-it-yourself.

Greece, Spain, and Portugal

In Spain and Portugal, the greening of educational and vocational training appears to have started only very recently. The focus is typically on technical issues of environmental management. In Greece, there is very little organised education and training of skilled and semi-skilled workers, and as such it has not been possible to obtain any useful information.

Characteristics of current initiatives in Germany and Denmark

The following is based on interviews with key persons at 13 vocational institutions in Denmark and Germany (6 and 7 institutions respectively).

The two countries' educational and training courses are described below, including the level at which they are offered (especially for those in section 4.2.2). These levels, which are described in annex 1, were set by the EU in 1985.

Institutions and respondents

Characteristics of the selected institutions

The main aim of the institutions included in the study is to provide educational and vocational training courses for people in the labour market - either to prepare them for a coming job or improve their skills in their present job. Some institutions also have a secondary aim, e.g. integrating people of different nationalities and giving industries a better reputation.

Other institutions give courses to specific target groups. These can be courses for members of trade unions, courses for certain categories of skilled or semi-skilled workers, courses aimed at a certain educational level, or courses for the employed or the unemployed.

The vocational institutions included in the study vary in size from 4 to 650 full- and part-time instructors, and from 140 to 40,000 course participants per year. The length of course also varies widely, from 2 days to 1 year.

Characteristics of the respondents

All respondents have a professional background, with a basis in either:

- higher education: typically with an M.Sc. from the natural sciences, but there are also several respondents from the humanities and the social sciences;



- technical education of medium length: secondary school instructors (specialised in natural sciences), laboratory assistant, environmental assistant, technical assistant, other instructors;
- trade education;
- a skill (e.g. smiths or mechanics).

Respondents' responsibilities (i.e. for environmental training) in their jobs include:

- teaching: development of courses, educating other instructors;
- administration: planning, deputy head, co-ordinating, secretarial work for a committee, educational manager, management - responsibility for a group of courses, finding the necessary resources;
- other responsibilities: organising conferences, safety representative, scientific consultant/supporter to a pilot project, PR and contacts with companies, organising and supporting other instructors.

Vocational training practices and marketing

Environmental courses offered

The different types of environment-related courses offered at the vocational institutions analysed in this report are listed below. They either constitute a whole training package, part of a training package, or an independent course. At some institutions, environmental aspects are integrated into existing courses, and therefore do not rate a separate mention. Other institutions offer company-specific courses, which are not easy to describe.

The courses are listed separately for each country. This is done for the reader's sake only, and should not be seen as an attempt at comparison, since the information available is neither representative nor homogeneous enough for this purpose.

Environmental course offered in Denmark

Environmental technology courses

Some of the Danish vocational training centres offer courses on solid and liquid waste, as well as waste water.

Solid and liquid waste

Basic course on waste (3 weeks), followed by various specialised courses (1 week each). Includes such topics as:

- sewage;
- organic waste;
- refuse;
- construction and waste;
- polluted soil;

- the handling of oil and chemical waste;
- road transport of oil and chemical waste.
- Waste water.

A basic course, consisting of 3 separate courses (1 week each). Includes:

- basic cleaning principles;
- basic data and calculations;
- basic laboratory techniques.

This is followed by 3 different specialised courses (1 week each):

- chemical process techniques;
- biological process techniques;
- mud treatment.

In addition, there is a course on waste treatment for janitors (3 days) and a course on polluted waste for construction workers (3 days).

The courses also include more ordinary subjects, e.g. first aid, maths, labour market conditions, and ergonomics.

The courses are offered to skilled and semi-skilled workers (EU educational level 1-2), though most participants have been semi-skilled. More importantly, however, this course is for people already in a job or workers in the waste or waste water industry, although several participants were responsible for waste in an ordinary production company. Course participants vary from the mainly employed to the mainly unemployed.

Since 1985 and until a couple of years ago, waste water courses for engineers and operational employees were also offered by another institution, and will soon be offered again. The idea is to hold the course, which is developed by the institution itself, at the participants' workplace, which means that it is very company-specific.

Awareness courses

In Autumn 1995, several vocational training centres in Denmark started an Environmental Awareness course. The course, which the centres' instructors have been trained to run themselves, was tested during the first half of 1995.

There are between 12 - 14 participants in each course, which is for both the employed and the unemployed (EU educational level 1-2).

Since the course is government-financed, the centres can offer it free. Participants receive their normal pay, and their companies receive financial support equal to the highest level of unemployment benefit per employee.

The course is either a one-week or three-day course. The 3 basic topics taught in the one-week course are:

- basic environmental knowledge;
- social and psychological knowledge;
- a structured way of working with the environment.

The latter follows the same stages as those used in environmental management, viz. objectives, registration, solutions, priorities, and action plans.

After the course, a course instructor visits employees to check whether they have carried out their action plan. Another motivating factor used at this institution is an internal rule which stipulates that there should be 3 people from the same company at the course. This increases the chances that things will be discussed and used when the course is over.

One large Danish company was reported as having saved a substantial amount of money through sending two of its employees on this course. The two came up with the idea of how to reuse some old products. Where old products are replaced by new ones, the serviceable parts of these are used to repair other old products.

Unrelated to the above, another institution has developed a 24-hour course on environmental awareness, which it has tested in a municipality as part of an EU project.

Environmental skilled building worker

One of the respondents is a member of a group which is trying to develop a green vocational training course (skilled building worker) (EU educational level 2) in collaboration with a technical college and a vocational training centre. At the moment, however, they are still in the process of applying for the necessary funding. The course aims to integrate environmental aspects into traditional occupational jobs, e.g. trainee building workers not only learn how to build a house, office block, etc., but also how to dispose of/recycle/reuse building materials.

The external environment

One of the institutions offers both a one-week course on the external environment and a two-day conference on the workplace and the external environment. The latter is meant primarily for shop stewards and safety representatives (EU educational level 1-3). The course deals with environmental problems at global, regional and national levels, including the relation between companies and the environment, e.g. cleaner technology, the ozone layer, and the greenhouse effect. There is also a discussion of the individual and the environment - in other words, what the individual can do.

A one-week course on environmental management, which is a continuation of the previous course on the external environment, was tested in Autumn 1995. Starting in January 1996, an environmental management course was offered for participants who had already completed the external environment course. The aim of the new course is to give shop stewards and safety representatives the necessary background for understanding and dealing with their company's environmental management system. The course discusses the principles and concepts of environmental management, the employees' role in relation to such a system, and what demands shop stewards and safety representatives should make (e.g. the connection between the external and internal environment).

Environment A and environment B

The external environment is taught as part of the social science subjects included in many occupational courses for trainee skilled workers (EU educational level 2). There are two courses - environment A and environment B - which in some places are compulsory and in others optional. Students are graded in these courses. Environment A and environment B are compulsory in 12 and 23 courses respectively out of the 87 vocational training packages offered at technical colleges.

The aim of environment A is to enable participants to understand and contribute towards creating the best possible work environment, as well as reduce the influence of households and companies' production on the external environment. In all, there are 60 classes of environment A.

The aim of environment B is to give participants an understanding of the natural environment as a basis for production, and to give an insight into the interaction between society and the environment. There are 30 classes of environment B.

Advanced environment course

At one institution, trainee skilled workers can choose between several optional subjects. (EU educational level 2).

One of these is science (40 classes per semester). This course deals with problems related to students' everyday life, economic life, and society, e.g. the patterns of energy consumption in society and the family. Are there enough resources for this consumption? How does it affect the environment?

A second optional course is alternative energy. This deals with cleaner energy sources, e.g. wind power, thermal energy, solar energy, biogas, straw burning and wave energy.

Linking secondary education and vocational training

One of the institutions included in this study has developed a one-year course which combines lower sixth form and the first half year of vocational training (EU educational level 1-2). Students are at the vocational college two days a week, and at a comprehensive school the rest of the week. This crams more lectures into a shorter period of time, but it saves half a year in the end. The main



subject at this course is the external environment - students build a scale model of a house themselves, which, among other things, they fit with various cleaner sources of energy.

Technical assistants

Another of the vocational training institutions included in the study is developing an environmental course for technical assistants (EU educational level 3), and other institutions are expected to follow suit. The institution has received external funds to run the course, the aim of which is to upgrade the qualifications of unemployed technical assistants in order to improve their job situation. This institution expects that the environment will become more important for an increasing number of companies in the future. The course lasts 20 weeks, and has a quota of 12-14 participants. It started in Autumn 1995.

In-service courses for skilled workers

Another vocational training institution offers a package of three environmental courses for skilled workers (EU educational level 3). These in-service courses, as they are known, last three days and deal with: (i) general environment knowledge (environmental awareness); (ii) cleaner technology and environmental accountancy; and (iii) a not-yet specified course which was expected to be ready by January 1996. These courses are primarily aimed at companies in the process of acquiring environmental certification.

Courses for technicians with at least two years' training

This is a 9-month environment-related course, covering:

- cleaner technology;
- life cycle analysis;
- life cycle statements.

The course has been developed in collaboration with the Technical University of Denmark and The Danish Technological Institute, and is for technicians with at least two years of training in addition to their vocational training (EU educational level 3).

International Networks

One institution is a member of an international network dedicated to incorporating the environment into education. The network consists of the Danish institution and similar institutions in Scotland, Slovenia, Germany and Portugal. The project is expected to run for eighteen months, depending on financing. The aim of the project is, by describing and analysing all the environmental factors involved in vocational training, to identify the really important ones.

Another Danish institution with international activities in relation to the environment has established a network for vocational institutions called Vocational European Environmental Education Programme (VEEEP). The aim of VEEEP is to use the principles behind EMAS to integrate the environment into training courses which can be used both in vocational institutions and industry. The network started in 1992 with a conference for about 40 participants, and is

financed by the EU. So far, there have been three conferences - in Denmark, Italy and Portugal in 1993 and 1994 respectively. In 1995 the focus was on EMAS. There are currently 20-30 member institutions. Others are welcome to join if they can meet the basic requirements - among others, access to e-mail.

A third Danish institution has contacts with institutions in central and eastern Europe, where they help to get technical schools started. The external environment is included as a subject in these projects.

Other environment-related activities

One institution has carried out an environmental audit with the help of a consultancy firm. Since including all environmental aspects would make the audit enormously complicated, a few main factors have been singled out, primarily:

- hazardous substances;
- drainage;
- oil;
- liquids.

The environmental audit is seen as the first important step towards environment certification (BS7750), for which a plan has been drawn up.

Finally, one institution has formulated an environmental policy. The aim of this institution is to be at the forefront of vocational training, where environmental aspects are dealt with on the same level as the latest social and technological developments. The institution has also formulated environmental strategies, which are revised once a year. One is to define relevant environmental aspects and incorporate them in each course in response to future needs.

Environmental courses offered in Germany

Pilot project

One institution has no specific environmental courses at the moment, but is participating in a pilot project to integrate environmental issues into ordinary vocational training for different occupations (EU educational level 1-3). The topics are organised in modules, with a main focus on, for example:

- synthetic materials;
- waste disposal;
- materials handling.

Since environmental topics are a relatively new introduction, the target group for the pilot project includes both instructors, who need training and support, and students. There are two groups of

instructors - those who work full-time in the vocational training centre and those who also have a normal job in the company of which the centre is a part.

This institution offers seminars to instructors and operational managers on, for example, environmental training, environmental management, and EMAS. It also wants to hold seminars for external apprentices and students, but this is difficult because apprentices and students seldom participate in external courses as part of their training.

Environmental protection

A typical German "environmental-state-of-the-art" vocational training institution has a range of different courses, including:

- environmental protection;
- waste management;
- energy-saving;
- environment-friendly and energy-saving installation techniques.

These courses are typically for skilled workers, foremen and technicians, and last between 2-5 days (EU educational level 2-3). Courses of longer duration (up to 1 1/2 years) are also offered, e.g. for the long-term unemployed, although engineers and managers also participate occasionally.

Technical vocational education, further education, and courses for the unemployed

One educational institution offers courses in three areas concerning the environment. The institution has 20 full-time employees with administrative and teaching duties, as well as 40 contract-hired foremen and master builders who mainly teach. The environmental part of the courses described below last between 3 days and 6 months.

The first area is technical vocational training. The target group is young people between the ages of 16 and 18 who have completed secondary school (EU educational level 1). There are about 350 students enrolled in this training programme at the moment. Until 1990, protection of the environment was not directly included, though a course unit in this has now been added. This also involves participants in practical work, e.g. a solar or wind energy project.

The second area is further training (EU educational level 2-3), where courses last between 2 days and 2 years. These courses are for both the employed and the unemployed and for people with a technical as well as economic background. There are an average 200-220 people a year in the longer courses (> 1/2 year), and 400-500 in the shorter courses. A new training programme on recycling white goods was planned for 1996. Many of the courses in this area already include environmental protection - for example, the course for white-collar workers includes a subject called the "environmentally correct office".

The target group of the third area is the unemployed. One project deals with the dismantling of a steelworks in an environmental-friendly way. This involves as much reuse or recycling of

materials as possible, disposal of environmentally hazardous materials, and leaving the site without any "hidden" environmental problems.

A union's approach to environmental vocational training

A German union has included a number of seminars for shop stewards, safety representatives, and instructors as part of their training activities. Those on work safety and environmental protection were revised in 1987. Young people entering the labour market now receive information about both the industry and the environment. The seminars last between 2 days and one week.

Supply and disposal

A German institution offers a 3-year basic course on water supply, waste water treatment, and waste handling which has existed for more than 10 years (Ver- und Entsorger). The course includes the collection and purification of waste water and mud and the disposal or reuse of waste. Legal, safety and measurement aspects are also included. Part of the course involves practical training in selected companies. There were many problems at the start, e.g. finding the right companies for practical training, and training teachers with many different professional backgrounds and a lack of environmental experience.

Waste water treatment and channel management

The same German institution offers two basic courses for semi-skilled workers. The first one deals with water supply and waste water treatment and the second with the management of water channels. The courses last two weeks and are held in connection with two practical training courses, also lasting two weeks each. The two basic courses can be followed up with courses on laboratory techniques and microscopy.

There is a 12-week course for workers who have been employed at a waste water treatment plant for a longer period, which will give them the same qualifications as the 3-year basic course mentioned above (EU educational level 1-2). The 12 weeks are split into 5 modules, which are given over a period of 6 months.

There is also the possibility of a two-year course leading to foreman in water supply and waste water management (Meister in Ver- und Entsorger) (EU educational level 3). This is for foremen who have already passed the introductory (Ver- und Entsorger) course and who have been at a water treatment plant for at least 3 years after that. The course consists primarily of independent studies, and a total of 44 days of classes during the two years. In Autumn 1995, a new teaching approach was introduced. Classes are now concentrated over two weeks, followed by one to two months of independent study, which gives a total of 29 weeks of classes over the two years.

Marketing and information

Information about the above-mentioned courses is typically available via:

- materials sent to employment services;
- materials sent to companies and public institutions;



- direct approaches from institutions' own consulting/marketing departments;
- instructors' personal networks/contacts;
- adverts in a local or national newspaper;
- trade unions and contacts in employers' associations;
- information meetings;
- brochures distributed at congresses, seminars, etc.

Several respondents have stated that, in some institutions, there are differences of opinion about who is best at promoting and selling the courses - the instructors or the marketing/consulting department. The instructors think they are better at it because they know more about the product (the courses), while others say they should stick to teaching and let the marketing/consulting department take care of promotion.

Teaching approaches

Teaching Methods

Practically all the respondents said that their aim was to make all courses and training as relevant to participants' everyday work and life as possible, and, in addition, to make them as interesting and varied as possible in order to motivate participants.

Teaching approaches included:

- projects / group work / team-oriented (primarily in Denmark);
- workshops (not practicable in all cases, however, e.g. solid waste and waste water);
- excursions;
- videos and slides;
- discussions, aimed at encouraging participants to come up with their own ideas, and independent studies;
- role-playing, recorded on video (regarded as an important future teaching method). In role plays, participants relate to a specific problem, and then afterwards judge their own performance from the video recording.

German courses tend to be dominated by the traditional lecture approach, in contrast to Danish courses, which are often based on a variety of methods, typically used in combination and with the aim of active interaction with the course participants.

Teaching materials

A general impression, also shared by a majority of the interviewees, was that there is very little teaching material on the external environment. Several of the respondents/institutions are in the process of developing their own specific course material, while others are developing materials for more general use. Thus, one institution has published an environmental encyclopaedia, while another has set up its own environment library of books and magazines, which it makes available to the public.

The more standardised courses (e.g. courses offered throughout Denmark in similar institutions) have their own general internal materials (photocopies), specifically developed for these courses. Some instructors also make their own personal materials available. However, as one of the respondents pointed out, this very much depends on the individual instructor's commitment to the subject.

The level of management-related environmental knowledge among instructors

Most respondents agree that the lack of teaching materials in the area is a problem. Instructors are usually expected to find the material they want for their courses themselves. If they want to keep up-to-date with developments, therefore, they typically have to use some of their own time to do it. An important related point is that instructors often teach a very broad range of courses, which means that they cannot specialise and keep up-to-date with everything.

The critical problem, one respondent argued, relates to the actual teaching - instructors need to remember that they are first and foremost instructors, not environmental experts. There is a wealth of scientific material on the environment, but instructors have no time to read it, and besides, there is no direct need for it in the courses, because these have to be much more basic and practical. Most of the institutions included in this study are trying to do something about these problems. Some of the approaches they have adopted are described below.

One approach is to pool information. Instructors have a wide range of different educational and professional backgrounds, which is an ideal starting point for effective networks. At one institution, instructors are so-called environmental coordinators, who are responsible for co-ordinating the integration of the environment in the various classes.

Another approach has been to send instructors on relevant courses - either internal or external. At one institution, for example, all instructors are offered a three-day basic course in cleaner technology, the internal environment, and environmental accounting. This institution also sends instructors on external courses, or on visits to places and/or persons who have the required knowledge.

A third approach has been to make instructors responsible for keeping themselves up-to-date in a specific course and informing the other instructors about it. A final approach is the development of a database with easy access to relevant information.

Drivers and problems

Initiation and development of environmental activities

According to the respondents, practically all such activities started in the late 1980s and/or early 1990s. A few institutions already had some strictly technical courses, e.g. waste water treatment, but the subject of the external environment is now being approached from a broader perspective. While the first courses were nearly all more or less technical oriented, the integration of the environment into existing courses has since proceeded apace. Interest is still growing, and most



respondents say that it is likely to continue to do so for many years. Notwithstanding, quite a few of the vocational training institutions have still not got much further than a very preliminary phase in the development of environment-related courses.

One institution subscribes to a considerable number of environmental magazines in order to determine the corporate need for environment-related courses. Other institutions keep a watchful eye on legislative initiatives, while others again base their courses around corporate developments and social trends.

Initiators of the greening process

Environment-related courses and activities at vocational training institutions are typically initiated and developed by:

- a group of instructors, or a single instructor with a deep personal interest;
- vocational training centres themselves;
- trade unions;
- co-operation between an institution and its external partners.

Background of the greening process

Environment-related courses and activities were started for various reasons, both internal and external.

Internal reasons include:

- internal political and/or ethical reasons;
- union demands for a say on problems related to ordinary workers;
- institutions' desire to anticipate corporate needs.

External reasons include:

- the general trends and need for change in society, e.g. prevention is better than cure;
- environmental awareness, both at home and in industry;
- the growing body of scientific evidence on environmental deterioration.

Problems and solutions during the greening process

Surprisingly, in view of the wide interest, a couple of the vocational institutions included in the study have sometimes found it difficult to fill their courses. This is primarily connected with in-service courses. In one case, the problem is that the courses are only offered in the evening after work, and employees are notoriously reluctant to attend courses in their spare time.

Another problem is that, in some industries, there is no tradition for sending employees on courses, although a lack of willingness on the employees' part to participate in courses of any kind has also been mentioned.

A third problem is that some of the courses target both the employed and the unemployed, which usually means that they are too general for the former. The employed (as well as their employers) tend to be more interested in skills they can relate to, and use directly in, their daily work.

A union, which itself offers environmental vocational training, has carried out a study which, among other things, shows that the environment is sometimes considered more important than even wages, i.e. people care more about their health and the company's image than how much they earn. However, some employees still seem to find it difficult to learn new things and change the way they have been doing things all their life, and course participants sometimes tend to be more interested in subjects that are directly related to the course exam, which is not always the case with environmental subjects.

Other institutions have problems with internal instructor-employee relations. Several respondents argued that some instructors tend to shy away from new subjects, and have a hard time accepting the fact that, for example, they have to include the environment in their classes - classes which, in many cases, they have been teaching the same way for years. The integration of the environment can therefore take a lot longer than originally imagined.

Additional problems crop up in connection with corporate attitudes to environment-related courses. For example, in a few cases, companies only want their employees to learn more basic skills, directly related to the job, and not "waste time" on subjects like the environment. Another problem, which some workers felt keenly, is that, while a lot of managers often talk about the importance of environmental knowledge, few actually do anything about it. They do not spend/allocate enough resources to educate their employees. Thus, some companies have complained that unions and others make too many and too costly demands concerning employee training.

Another problem experienced by providers of vocational training is that employees are often sent on environment-related courses long after management has decided to apply for environmental certification (e.g. BS7750). As one respondent observed, this may have a strong negative effect on employees' motivation for the course, because it gives them the impression that this is yet another thing management has decided without consulting them (top-down).

A final problem is the rapidly growing number of ad hoc and uncoordinated courses being offered, a development which less nimble-footed institutions have difficulty in keeping pace with. The environment is a fast-developing area in which the demand for courses is ever-changing. Institutions must be prepared to live up to these demands.

There was no shortage of suggestions about what could be done to limit these problems. Among other things, interviewees said that:

- institutions should anticipate more;
- it is important to be as well prepared as possible;



- institutions must be "on top" of the situation;
- the "right" people must be involved from the start;
- things should not proceed too fast;
- it is important to keep in touch with relevant companies, institutions and individuals;
- the institution's knowledge about what kind of courses companies will demand in future should be continually updated.

Among the more "radical" solutions suggested is the proposition that the law should be amended to require certain employees in certain types of companies to participate in specific environment-related courses.

Roles and activities

The role of vocational training institutions

There is general agreement among respondents in the vocational institutions that they should be ahead of developments, and thus adopt a proactive role.

However, most respondents think that their institution is already proactive as regards the environment, that it is aware of future needs and demands, and that it is trying to live up to these requirements. For example, in one institution, it is official policy to be at least two years ahead of corporate demands for environmental courses. It is no good students' qualifications being out of date when they finish their training. Most respondents said that there is a growing demand for employees with better environment-related qualifications.

Some respondents stressed that the educational system as a whole must recognise that all types of institutions have a responsibility for improving environment-related skills and competencies.

The aim of teaching activities

Respondents have a lot of different ideas about what training institutions should teach. One thing that most respondents agree on is that the institutions must meet companies' needs concerning employee qualifications. Some respondents mentioned the importance of primary skills - i.e. basic job-related knowledge. Knowledge about the environment can come later. One respondent put it like this: while pure environmental-awareness courses can be justified in some cases, this kind of course is only likely to be useful in the near future. In the long run, there will be an increasing need for courses involving more basic knowledge, i.e. those in which participants learn things they can use directly in their own jobs. It is not enough to be environmentally aware - awareness is necessary, but it is not enough, there are some concrete things you must know first. In these respondents' opinions, awareness courses will be an important part of future training, but they will not be very long.

Others mentioned the need for course participants to acquire factual knowledge, practical tools, and the latest techniques before they are presented with more abstract issues, and some respondents argue that course participants must learn to think about their own daily life in relation

to the environment, both at work and at home, in a more holistic way. One respondent clarified this: while it may be fairly easy to make employees behave in a more environment-friendly way at work - by telling them how to sort waste, for example - they are likely to do it more efficiently if they are aware of why they are doing it.

Integration versus specialisation in environmental education

There seems to be a consensus about the need for both specialised environmental courses and integrating the environment into the educational system. It is also generally acknowledged that there must be some specialised courses to meet specific needs, however.

An oft-heard comment was that integration is the right way to include the environment in the educational system. There will always be a need for specialised courses, e.g. solid waste and waste water, but in other areas the environment should be integrated. For example, a transport course should also include instruction on how to drive in an environmentally correct way.

Amount of time to offer on environment-related areas

Most respondents were unable to say precisely how much education and training should be environment-related. The "ideal" amount ranged between 5% and 33%.

Future aspects

The need for more environment-related training and education

Respondents generally agreed that more environment-related education is needed, and most do not see any problem integrating the environment into existing course structures. Nevertheless, practically all respondents mentioned one or more barriers to an increase in environment-related courses.

One obstacle frequently mentioned was the extent of instructors' environmental knowledge and their motivation to integrate the environment into the training programme. The general opinion was that instructors need further education. It was also felt that there is a general lack of acceptance among colleagues that the environment is part of the goal of training courses. Another barrier was that some instructors have been away from the normal labour market for too long, and consequently tend to have great difficulty in "seeing much further than their own nose".

It has sometimes also been felt difficult to convince companies that they will save money by sending their employees on an environmental awareness course. Some respondents said that PR efforts needed shaking up. One solution could be for several vocational institutions to make a joint effort.

Another problem mentioned was the perceived lack of choice of environment-related courses. New ideas are needed here. Respondents said that course participants often tend to choose courses which will benefit them directly, e.g. in the form of higher wages.



Expectations and hopes for the future

It was mentioned again and again that the educational system should include environmental aspects. In some respondents' view, there is a need both for further development of the courses and to include the environmental element as early as possible in the educational system.

While some respondents consider the integration of the external environment to be essential, others insist that both the internal and external environment should be included.

Expected future developments include:

- longer environmental awareness courses;
- more systematic environmental training and education;
- short basic environment courses;
- short and frequent (vocational) conferences and courses for updating knowledge;
- more structuralised environmental courses for specific industries; cleaner technology; life cycle analysis; and environmental management.

Many respondents mentioned the importance of national and international contacts, and the role of the educational institution in such collaboration. A few respondents think that Denmark is ahead as regards incorporating the environment into the educational system, despite the fact that most countries in the EU are technologically at the same level. This was explained by the way the environment is incorporated and by the fact that environmental awareness is thought to be greater in Denmark.

The ambition of one of the institutions included in the study is to become a model for the rest of Europe as regards the integration of the environment in vocational training, and it also wants to offer courses to vocational institutions in other countries.

Conclusion: characteristics of existing training initiatives and requirements

In general, the vocational training institutions included in this study provide various vocational training courses, including environment-related courses, to adults in the labour market.

The professional background of the instructors varies widely - some have academic degrees, in both natural and social sciences, while others have been through medium- to long-term vocational training, often building on their existing qualifications as a skilled worker. In addition to teaching, many also have various administrative responsibilities.

The environment-related courses offered can be divided into two main categories: (i) specialised courses, e.g. environmental technology (waste management, cleaning technologies, different process technologies), and (ii) more general courses, e.g. environmental awareness and environmental management. The majority of environment-related courses correspond to EU educational levels 1-3.

Classes are mainly small, up to 12-16 participants. In Germany, the courses were predominantly based on lectures, whereas in Denmark group work and field trips were often included. On the whole, instructors try to make the courses as realistic as possible.

The interviews revealed indications of an increasing tendency to include more environmental aspects in normal vocational courses (e.g. various courses for skilled workers). With regard to further training, i.e. after the completion of basic training, the general impression is that courses are ad hoc, unsystematic, and very limited in duration (typically a couple of days). A couple of institutions did offer courses of longer duration (up to six months), however.

Respondents in the various vocational training institutions complained of a general lack of quality teaching materials. Most had to develop their own, but were handicapped by the limited amount of time available for this. This was generally agreed to be a critical and somewhat demotivating factor, in view of the speed with which the subject changes.

There was a general tendency to exaggerate. Most respondents asserted that the greening of their courses started in the late 1980s, despite the fact that most courses offered today are of a very recent date (1 or 2 years old at most), while others are only now being introduced.

Individual instructors were generally acknowledged to be one of the most important catalysts of this process of transformation, although a couple of local vocational training centres and trade union educational units have also been given some credit.

One important drawback of some training courses was that they often take place after work, e.g. in the evening, and workers are generally reluctant to give up any of their leisure time. Other obstacles mentioned include some of the older instructors, who tend to resist change. In several cases, the training institutions have also experienced corporate scepticism, fuelled by suspicions that environmental competencies may be getting a higher priority than more basic vocational skills. It is also evident from the interviews with instructors that there tends to be a discrepancy between what companies say they are going to do and the amount of money they actually spend on training.

Another limiting factor is the lack of effective communication between industry and training institutions, reflected by the fact that training packages are sometimes offered to the wrong target group of companies.

All respondents stressed that their aim as instructors, as well as that of the institution as a whole, is to stay one step ahead of developments and meet whatever new demands the market makes. As has been seen, however, none yet seem able to meet this goal.

Regarding the future, the consensus seems to be that there is a need for both specialised environmental courses and the integration of the environmental dimension into the existing educational system.



There was general agreement that more environment-related education is necessary, and that some institutional resistance towards integrating environmental thinking can be expected.

Overview of vocational training activities in Denmark

Course topic	Category	EU training level	Duration
Solid & liquid waste	Skilled, semiskilled	1-2	3 weeks (basic) 1 week (specialist option)
Waste water	Skilled, semiskilled	1-2	3 one week courses (general) 1 week (specialist option)
Environmental awareness	Skilled, semiskilled	1-2	1 week course 2 day conference
External environment	Skilled, foremen, safety rep.	1-3	1 week
Environmental management	Skilled, foremen, safety rep.	1-3	one week
Environment A: Workplace	Skilled workers	2	n/a
Environment B: Nature & Society	Skilled workers	2	n/a
Science	Skilled workers	2	full semester, 40 classes
Alternative energy	Skilled workers	2	n/a
External environment	Skilled, semiskilled	1-2	1 year
General environment	Technical assistants	3	20 weeks
Environmental management	Technicians	3	9 months

Overview of vocational training activities in Germany

Course topic	Category	EU training level	Duration
Pilot project	Various	1-3	n/a
Environmental protection	Skilled, foremen, technicians	2-3	2-5 days
Waste management	Skilled, foremen, technicians	2-3	2-5 days
Energy saving	Skilled, foremen, technicians	2-3	2-5 days
Environment friendly installations	Skilled, foremen, technicians	2-3	2-5 days
Waste water treatment	Semi-skilled	1-2	2 weeks
Water channel management	Semi-skilled	1-2	2 weeks
Water management	Semi-skilled	1-2	12 weeks
Water manager	Foremen	3	44 days over 2 years



Examples of environmental education and training initiatives

Introduction

The following section presents six examples of the way in which different educational institutions have responded to the need for environmental training: (i) a course designed to increase environmental awareness; (ii) an institution with both a full-time manager of environmental affairs and a written environmental policy; (iii) an environmental course offered by a union; (iv) an institution which offers a range of courses on water and waste; (v) an institution which offers different environmental courses to skilled workers, foremen and technicians; and, (vi) a union which holds various seminars on the environment for its members.

Examples

Environmental awareness

This institution is a vocational training centre. There are about 200 affiliated teachers and approximately 10,000 course participants every year. Some courses last only a day or two, while others are of longer duration. The centre offers courses to both skilled and semi-skilled workers, both employed and unemployed. The institution has several different courses on waste and waste water, but these will not be described here.

The idea for the environmental awareness course was conceived a couple of years ago by an instructor at the institution. The course has not been tested yet, however, but is expected to be offered from Autumn 1995. The course, which is for people with an interest in environmental issues, lasts one week. Participants are preferably from the same company or same industry. There are 14-16 participants in each course.



The aim of the course is to increase participants' knowledge of environmental issues at the personal, company, and global levels, thereby enabling them to understand their own job situation in a more constructive and perceptive way.


The aims of the course are:

- to make participants more aware of their own possibilities for action on environmental issues, as well as to motivate them at personal, company, and societal levels;
- to introduce key environmental issues and to illuminate the relationships between the external environment and the work environment;
- to give participants an understanding of the importance of collaboration in organising efforts for environmental improvements;
- to present current environmental objectives at societal level, including an introduction to relevant environmental authorities.

The course includes the following topics:

- *Environmental background knowledge:* At the global level, participants are taught about nature's materials cycle, as well as relevant environmental problems, e.g. the greenhouse effect, water pollution, waste problems, and atmospheric pollution. At the societal level, both national and international environmental laws and regulations are described. At the company level, the environmental aspects of different industries and the philosophy behind the concepts of cleaner technology and sustainable development are introduced. At the personal level, participants are expected to acquire a greater understanding of households' influence on the external environment.
- *Social/psychological mechanisms:* At the company level, participants are expected to acquire an insight into how to handle collaboration - and organisation-related aspects during the process of change. At the personal level, participants are taught how to cope with personal psychological barriers to change. In addition, course participants are introduced to theories about motivation.
- *Structure:* Participants are introduced to the structure involved in making improvements to the environment: objectives - registration - solutions - action plan - evaluation - new objectives, and so on. This gives participants an idea of what they can do in the long run to improve the environment. Based on this, participants are expected to design a personal action plan for improving the environmental situation in their daily work - both changes which can be made immediately and in the long run.

The environmental awareness course includes a field trip to a selected company to give participants an idea of how improvements to both the external environment and the work environment can be organised and carried out in practice. Furthermore, the instructor who developed the course expects to visit participants at their daily work a month after the course is over.



Teaching is based on what can be called "experience-based teaching", which means getting participants to realise and use what they already know, and encouraging them to think, learn, and come up with their own ideas.

In Spring 1995, the 15 instructors who will be teaching the environmental awareness course went on a two-week course to become better acquainted with the course material.

Environmental manager and environmental policy

This is a technical college which employs about 500 people, about 350 of whom are teachers. Between 2500 and 3000 students a year follow the basic courses offered, while about 6000 people a year participate in one-week courses.

The institution has a written environmental policy, the aim of which is to:

- become a future-oriented vocational training institution at the environmental forefront of social and technical development;
- incorporate relevant environmental vocational training courses into existing educational courses;
- support the realisation of national and international environmental initiatives.

The institution's environmental policies, strategies, and action plans are revised annually, where the result is evaluated and new areas for action identified. Current strategies include:

- identifying and developing relevant vocational environmental elements into vocational courses, technical college courses, advanced engineering courses, datanomist courses, and open university courses;
- the promotion of relevant environmental modules to those requesting information about the institution's further education courses;
- identifying and developing relevant vocational environmental elements into the institution's international activities;
- improving the qualifications of the institution's employees to cope with/administer the activities in which they are involved;
- the marketing of the institution as a vocational college with a particular environmental policy.

The institution has had a full-time Manager of Environmental Affairs for the last 3 years. His job is to initiate/develop environmental activities - primarily the external environment - at the institution.

The aim of the college is to integrate environmental aspects into the various training and educational courses, not to focus specifically on the environment as part of an individual course.



The institution will soon be able to offer courses on waste water treatment, life cycle analysis, and environmental management. The environment manager has also conducted an environmental management course in Spain, where he taught employees from technical colleges all over Europe. The life cycle analysis course is ready to start, but due to pressure of work, it will not be offered until Spring 1996.

During the past five years, the institution has participated in various international environmental programmes in the EU, Poland, Lithuania and Hungary. These activities include:

- development of various employee courses at waste water treatment plants;
- training of staff and key personnel in companies in urban areas;
- activities connected with the discussing, planning, and developing of a transnational European Environmental Education;
- development and implementation of an environmental management system in the network of participating vocational colleges and institutions.

The institution achieved ISO 9001 certification in January 1995, but has no plans to obtain environmental certification as yet. Notwithstanding, wherever possible it is trying to comply with the principles behind EMAS.

A union approach to environmental vocational training

The main aim of this institution, which is the training unit of a national union, is to train shop stewards and safety representatives. The unit trains about 40,000 people a year from all over the country in a one-week course on the external environment. Courses are offered within 10 different fields, one of which - the so-called "green line" - is on safety and the environment. The green line includes courses on environmental law, the work environment, environmental impacts, and the external environment.

The aim of the external environment course is to familiarise participants with the extent and nature of global environmental problems. Participants are also told about the various international initiatives that are being taken to combat adverse environmental impacts at both national and transnational level (EU). With a starting point in international environmental issues, participants learn about present national environmental problems through cases of air, water and soil pollution.

Participants are introduced to the problems and conflicts between the work environment and the external environment on the basis of their own experiences and knowledge. The course also discusses the impact of environmental problems on society, industrial competition, and employment. Finally, participants are introduced to factors which, in both the short and long run, may enable them to exert more influence on environmental conditions in their own workplace.

The following issues are included in the course:

Global environmental crises:

- The greenhouse effect and depletion of the ozone layer.
- The traditional concept of growth and sustainable development.

National environmental problems:

- Air, waste and water.

National environmental initiatives:

- Aquatic Environment Plan, CFC action plan.
- Acid rain regulations.
- Waste regulations.
- Recycling and reuse.
- EU and international agreements on the environment.

Environmental laws:

- Structure, principles, and practice.
- The concept of cleaner technology.
- Agreements within certain industries and action plans.

The work environment and the external environment:

- Connections, delimitations, and contradictions.
- The role of the union.
- Environmental management, environmental accounting, and life cycle analysis.

The environment, the economy, and employment:

- The environment and the economy.
- The environment and industrial economy, niche production, and employment.
- The environment and the wage system.

Over the space of a year, the course is offered to members in about 14 cities, and during the past five years about 500 people have participated. In 1993, for example, about 93 people participated altogether, with an average of 13 people per course.

This institution also holds seminars of 1-2 days on environmental topics.

The training unit hopes to develop a course on environmental management for employees in companies which already have, or are planning to introduce, an environmental management system.



Water supply, waste water, and waste management

This institution is a member of the European Water Pollution Control Association. The aim of the institution is to prevent pollution of the aquatic environment by, for example, prescribing technical rules for waste water treatment plants and training employees responsible for the operation of such plants. Courses on the protection of the water environment have been offered since 1948, and at the moment the institution holds 50 courses a year for a total of 1300 participants.

One of these is a basic course on sewage water and waste water treatment plants. The course is aimed at unskilled or semi-skilled employees in sewage and waste water treatment plants, and lasts 6 weeks. The first step is a practical course, lasting at least two weeks, at a waste water treatment plant affiliated to the training institution. This is followed by a one-week basic course on the general aspects of waste water treatment. Next is another two-week practical course, where the general theory from the basic course is demonstrated in practise. The course ends with another one-week basic course, which builds on the theory and practise of the preceding courses. A similar course on the environmental aspects of managing water channels has been available since 1984.

Since 1988, courses for semi-skilled workers on laboratory and microscopy techniques have been offered. These were developed in recognition of the fact that the safe and effective operation of waste water treatment plants, as well as the minimisation of residuals in the cleaned water, depends on employees' knowledge of such techniques. The courses build on the two basic courses described above, and the target group is therefore employees with knowledge and experience of the technical part of waste water treatment and water channel management, but with little or no knowledge of the laboratory dimension. The laboratory part deals with the operation and reading of measurement instruments, how to analyse the information obtained, including laboratory safety procedures during the analyses, and how to interpret and apply the analysis results. The course is divided into three separate parts, lasting 3, 3, and 2 days respectively. The microscopy part deals with the biological aspects of sludge, and is intended to give participants better control of the whole process in waste water treatment plants. This is divided into two parts, each lasting 3 days.

This institution has also developed a programme as a complement to a general 3-year basic educational course on water supply, waste water treatment, or waste handling. This will enable unskilled or semi-skilled workers with sufficient practical experience to upgrade their qualifications to that of skilled worker. The programme consists of 11-12 weeks of concentrated courses, divided into 4-5 modules, depending on the selected specialisation: (i) a two-week introductory course, which introduces the programme as a whole and the teaching methods used, as well as some basic knowledge on natural science. This is to ensure that all participants will be at the same level; (ii) a 4-week course of elementary and general subjects, including legal, economic, and natural science topics, the handling of raw materials and machinery, and managerial documentation; (iii) a four-week specialisation course on water supply, waste water treatment, or waste handling; (iv) a one-week course in laboratory techniques for participants specialising in waste water treatment; and (v) a one-week course, which summarises essential parts of the programme. About 150 workers attend the course every year.

It is also possible to become a foreman in water supply and waste water handling. A course leading to this is offered to employees who have attended the above-mentioned basic courses and who have a further three years of practical experience at a waste water treatment plant. The institution can also offer this course as a two-year distance learning package, which includes 44 days of classes and a 29-week distance programme. About 100 foremen are trained annually.

The institution also offers continuous in-house training for employees in waste water treatment plants, e.g. a one-day course on a new law about waste water treatment. There is a large need for such short, knowledge-updating courses.

All the courses described above consist primarily of lectures, though instructors are trying to fit in time for discussions and questions. Group work is occasionally included, but there is rarely time for it.

This institution faces two problems in connection with its courses. Environmental protection is the "in" thing, and the number of courses dealing with the topic has exploded over the past few years. This makes it difficult for potential participants to identify the good courses from the bad. Another problem experienced by the institution is that, while a lot of people have been trained in environmental protection during recent years, not enough attention has been paid to future demands for such skills. Thus, in some parts of the country in question, participants have found it increasingly difficult to find a relevant job after completing their vocational education.

General retraining in environmental issues

This institution was established in 1985 on the initiative of several public organisations and unions. Today, support comes from representatives from unemployment organisations, clerical organisations, retraining and research organisations, trade and industry, as well as individuals from science, politics and economics.

The institution has two overall goals:

- vocational qualifications and employment in environmental protection and environmental techniques;
- qualification and vocational reintegration of the "permanently" unemployed.

It seeks to fulfil these goals through courses, various job schemes, and conferences and studies within the following:

- vocational environmental education;
- vocational and social (re-)integration of the long-term unemployed and those threatened with unemployment;
- general education, cultural integration, and European co-operation.

About 300-350 people a year participate in courses at this institution, which has about 10 instructors.

The institution offers a number of courses, of which the four most relevant to this study are described below. Common to them all is that they are offered to skilled workers, foremen and technicians (EU educational level 2-3) in SMEs in trade and industry which either have taken some environmental action or expect to do so in the near future. All courses last between two and five days. The content of the four courses are:

- **Environmental protection in the industry:** Deals with general aspects of environmental management. The course covers such topics as environmental protection and legal regulations, the responsibility of the individual, sustainable production methods, ecological management within the production process, and administrative routines and economic aspects.
- **Practical management of waste in the company:** This course starts by explaining the *raison d'être* behind regulations, and goes on to discuss how waste is created during production, how it can be avoided or reduced, and how it is disposed of.
- **Rational use of energy and energy savings:** Focuses on the potential cost savings to be achieved by saving energy in the company. The course includes the profitability of cost-saving initiatives, the analysis of the company's energy costs, the control of energy costs, technical solutions for saving energy, and financial aspects.
- **Environmental-protection and energy-saving equipment:** The general aim of this course is to acquaint participants with the latest trends in energy-saving and environment-friendly production machinery. The main focus is on energy saving for SMEs, since they often have difficulty in taking advantage of new technology compared with LEs. Two main topics are alternative, decentralised energy sources, e.g. solar energy or biogas plants, and water supply and treatment of waste water.

A union's attempt at environmental preservation

The main aim of this institution, which is a union's environmental unit, is to promote measures for preventing environmental degradation by industry, thereby helping to improve the industry's negative reputation.

The various environment-related activities of the institution include:

- an environmental guidance programme;
- an industrial recycling development programme;
- an annual environmental award;
- studies on various environmental aspects of industrial production, etc.;
- seminars/meetings/conferences;
- the support of sustainable development in the industry.

The institution only arranges courses and seminars - the actual teaching is done by external instructors. Various seminars have been held during the 1990s, some of which are mentioned below:

- regional structural change and environmental protection;
- industrial recycling;
- perspectives in environmental regeneration and employment;
- recycling of electronic scrap;
- eco-audits and social competence;
- work safety /work protection;
- the economics of recycling;
- environmental protection as a knowledge factor.

As part of the environmental guidance programme, a number of general courses have been held or planned, as well as company-specific courses. The topics of the general courses include:

- environmental protection in the industry, with an emphasis on project work, with the aim of training employees as internal experts;
- a general introduction to environmental regulations;
- developing a concept for waste handling;
- from waste disposal to recycling;
- sustainable development and recycling;
- environmental management and eco-auditing;
- old burdens/habits - new perspectives.

The institution is gradually moving away from lectures to using group-oriented methods, and in the near future, role-plays and video-recordings are also expected to be used. In the role-plays, participants will be given concrete problems to discuss and act out two different roles, e.g. manager - employee, company - authorities. Afterwards, the whole class will see the video together and discuss their performance.

The institution has issued a number of publications on various topics dealing with employees and the environmental situation in the company. These include:

- preventing environmental dysfunctions and disasters, legal and practical aspects, and checklists;
- employee participation and environmental protection, including legal aspects, responsibilities, potential penalties, and the influence of the shop steward;
- environmental protection and disposal, including practical aspects such as conveniently placed containers for waste, waste disposal concepts, and cooperation with waste-collection companies, including managerial aspects such as economic calculations, recording systems and checklists.

The institution has published a book of interdisciplinary readings on the work environment and the external environment in the company. The aim of this is to stimulate instructors to intensify employee education with regard to environmental protection.



Conclusions and future actions and activities

Overall conclusions

The TEM 1 project found that, since the early 1990s, the European Union has included a concept of sustainability in its environmental policy relating to that of the World Commission for Environment and Development. During the time of the present study, however, it has become apparent that this has not yet fundamentally changed environment-threatening socio-economic and socio-cultural patterns of consumption.

Basically, the seriousness of the situation has not altered. On the contrary, from a macro socio-economic point of view, it can even be considered to have worsened. There has been a profound change in the attitudes and values of individual stakeholders towards more environmental concern, based on the recognition that man cannot continue indefinitely along the present environmentally harmful trajectory without causing irreversible damage to the very basis for economic development (Environmental Agency, 1995).

One means of facilitating such a change is life-long training and education, which is thus one of the most critical forces for the continued diffusion and adoption of environmentally less harmful production and consumption behaviour.

Throughout this study, it has been asserted that environmental concern is equally important, and that it can be increasingly expected to become an integral part of the job situation across disciplines and organisational functions and layers. During the series of interviews of shop-floor employees, including lower managers, this study has found that the extent of training needs and requirements as a result of the greening of business organisations is the same whether the organisation is seen from 'the top' (as in TEM 1) or 'the bottom', as in this study (TEM 2).

Operational initiatives and training requirements

The main features of operational environmental management initiatives and training experiences and/or requirements found in this study typically include all or part of the following issues:

- substitution of environmentally hazardous substances;
- continued reductions (beyond compliance) of air and water emissions, as well as dust, noise and smell;
- various waste management initiatives, e.g. sorting, recycling and reuse;
- environmental issues have generally not been incorporated into traditional vocational training, but are offered as short additional courses;
- information about corporate environmental initiatives is typically disseminated through various channels, e.g. internal newsletters, notice boards, foremen, etc.;
- a majority of respondents think that environmental issues will become an increasingly larger part of their jobs in future;
- almost all respondents wanted more and longer training in environmental issues;
- respondents also wanted more information about environmental issues not immediately connected with their specific jobs;
- German skilled workers tend to have a fairly strong background in basic technical aspects of the environment and/or cleaner technology related to their jobs;
- Danish workers and lower management included in this study tend to think that increasing corporate greening activities will result in more work for them;
- parts of lower management said that their responsibility with regard to the environment was much too unformalised and ill-defined, which caused frustration and confusion;
- small 'symbolic' rewards, i.e. no major monetary rewards, were the rule rather than the exception in this study.

On the whole, front personnel were well aware of the main environmental problems in their workplace in general and their job situation in particular (often very detailed knowledge of the latter), and that they both have a negative effect on the environment and the opportunity to make a difference. Lower management generally perceived their workforce as having a positive attitude to the environment. These managers also recognised the importance of motivating and rewarding employees (in non-monetary terms).

Shop-floor workers and lower management generally found that other parts of management were as environmentally responsible as competition allowed. As a rule, however, workers and foremen are either not aware of or know very little about the specific content of 'their' company's corporate environmental policy and plans. However, in those companies visited in this study which were BS 7750 certified, workers and lower management had a remarkably higher level of knowledge about corporate environmental policy and plans.

This study could find no evidence to support the widespread belief that lower management, e.g. foremen, have an inherent tendency to oppose change. On the contrary, foremen were often mentioned by the interviewed workers to play an important role as 'your nearest environmental

guide', someone to turn to whenever they had a practical environment-related problem. Furthermore, in Denmark there is a long tradition for worker participation in major changes. This also tends to be the case regarding the implementation of an environmental management system, e.g. BS7750. On the other hand, both foremen and workers mentioned a few colleagues who were very difficult to motivate to any kind of change including environmental initiatives.

Educational institution

Vocational training of relevance to environmental issues can be grouped into two categories: (i) specialised and/or technical courses, and (ii) more general environmental and awareness-promoting courses. The characteristics of such courses can be summarised as follows:

- the main teaching approach used by instructors at German vocational training institutions is lectures;
- Danish instructors, on the other hand, use a variety of teaching approaches, including group work, private study, and field trips;
- vocational environmental training courses in Germany tend to focus primarily on specialist and/or technical issues;
- in addition to developing courses and teaching, instructors also perform a number of administrative jobs, including fund-raising, consulting, etc.;
- vocational training in environmental management is still in its infancy - most courses are of a very recent date;
- internal or external ad hoc training of various categories of employees is typically very short and unstructured, with no built-in progression for the individual worker (i.e. supply-oriented);
- the duration of courses analysed in this study ranged from 1/2 day to 1 or two years (in rare cases), with most lasting a couple of days;
- environment-related vocational training courses are offered by various external institutions, ranging from traditional vocational training centres to more target-specific institutions, e.g. unions;
- information about courses did not always appear to reach all of the target group;
- a majority of instructors wanted more teaching materials;
- many of the interviewed instructors said that far too much of their time was devoted to developing suitable teaching materials;
- typically, the initiating and catalysing force for change at the various interviewed institutions turned out to be one or two individual instructors with a deep personal interest in the environment;
- there was a strongly felt need among interviewed instructors to improve the possibilities for continuous 'training of the trainers'.

Most vocational institutions recognised that, ideally, they have to stay one step ahead of the needs of their 'customers', i.e. industry. The evidence presented in this study seems to indicate that this is not the case, however.

Future actions and research needs

At the half-way stage of this four-year study on educational needs and requirements, there is some support for concluding that, up to now, the overall "greening process" in both the business community and the educational system has mainly been a top-down process.

Probably one of the clearest messages to vocational instructors is the strongly felt need for more environment-related courses of longer duration, and with a built-in possibility for progression, by which is meant that participants can build on previous courses and that training will be offered on a continuous basis.

The conclusion in TEM 1 - that educators find it difficult to meet industry's needs for a sufficiently skilled workforce - also applies to this study, if not more so, since vocational institutions are responsible for the education and training of the majority of employees in industry, i.e. the workers. Despite the fact that the institutions included in TEM 2 were said by experts to represent the state of the art as regards environmental concern, it must be concluded that the integration of environmental-management-related issues has only just begun in the more progressive countries. EU Member States are therefore in the position of having a workforce which is generally poorly equipped to cope with the ever-changing demands both of new environmental regulation and various stakeholders.

As in TEM 1, it was also found that some vocational trainers are opposed to change. However, unlike their scientific colleagues at institutions of higher education, this is mainly a resistance towards change in general, and is not based on epistemological or ontological differences. One way of overcoming this could be to "train the trainers" on a continuous basis.

The study did not identify any significant financial and/or HRM-related constraints on managers' and educators' attempts to respond to the environmental challenge. With regard to industry, there are no particular financial constraints on the training and/or retraining of workers in new environment-related practices, beyond the general recognition that economic resources are always finite. Indeed, at the moment, industry seems to bear the largest burden for retraining the workforce in environment-related issues. However, the lack of adequate HRM-related practices tends to seriously limit the exploitation of corporate investments in new environmental-management-related practices and training initiatives. As further elaborated in annex 2 HRM offers some interesting possibilities.

With regard to the vocational training institutions themselves, the most critical constraints tend to be lack of time (for preparation, continuous retraining, and the development of training kits) and the commitment of all educators. Far too much time is spent on administrative tasks, including fund-raising for new activities, and there are too few opportunities for "retraining the trainers".

Another central question may therefore be whether there is a possibility for a joint approach to environmental management training in a vocational training context. Unlike TEM 1, which raised



some objections to a "too harmonised" approach, in TEM 2 it is hard to see what objection there could be to a harmonised vocational approach to integrating aspects of environmental management into existing courses and programmes.

Arguments in favour of a joint strategy include:

- it has a cost-effective potential;
- it could speed up the process as a whole, since most of the thousands of existing training institutions do not have the necessary resources to do it themselves;
- it could give individual instructors more time to develop the educational dimensions of the courses and continue their own retraining;
- it will improve the possibilities for implementing the same corporate environmental standards in all the various divisions of a transnational corporation, since local staff can be expected to have the "same qualifications".

Before such a strategy can succeed, more needs to be known about:

- what should a joint environment-related training approach contain?
- can a joint approach be used across industry boundaries, or will it have to be restricted to specific industries and/or sectors?
- how can such training be provided most effectively?
- can future educators at vocational training institutions continue to be skilled workers with a "union" instructor qualification, or will they have to supplement their vocational training with teacher training?
- if developments are to be monitored, what kind of statistics, etc., of Member States' education and training are needed, and what should they contain?
- how can lower management become more visible and recognised in their role as environmental guides and/or instructors for the workers?
- how will these managers' job situation change in a future decentralisation of corporate environmental management tasks?





References

Andersen, Karsten (1993). *Beskrivelse af den første faglige grunduddannelse inden for det miljøtekniske område i Tyskland*. Brancheudvalget for Bygge og Anlægs Arbejdsmarkedsuddannelser, Vanløse (in Danish).

Arbejderbevægelsens erhvervsråd & CASA (1995). *Miljø og beskæftigelse. Hovedrapport*. København (in Danish).

Arbejderbevægelsens erhvervsråd & CASA (1995). *Miljø og beskæftigelse. Uddannelse*. København (in Danish).

Baudish, Hilde Biehler (1994). Environmental Training in Germany. *Journal of European Industrial Training*, 18, 3, pp. 10-16.

Bjorkquist, D.C. & Lewis, T. (1994). A Model for Training Research from the Workers' perspective. *Human Resource Development Quarterly*, 5(2), pp. 11-129.

Buhler, P. (1994). Motivating the Employee of the 90s. *Supervision*, 55(7), pp. 8-10.

Chomé, Gesa (1993). *Occupational Profiles in Environmental Protection*. Berlin: CEDEFOP - European Centre for the Development of Vocational Training.

COM (91) 397 Commission Memorandum on Vocational Training in the European Community in the 1980s

COM (93) 183 Commission Working Paper - Guidelines for Community Action - in the Field of Education and Training.

Currid, Cheryl. "What to do when money doesn't motivate". *Network World*. vol 12 iss 14 apr 3 1995 p. 52.

Danish Metalworkers Union, Committee on Environmental Policy (Kampman Committee) (1991). *Environmental Regulation and Economic growth*. Copenhagen:Danish Metalworkers Union

Davies, W. Keith. "The new paradigm is learning". *Journal of European Industrial Training*. Vol 19 iss 4 1995 pp. i-ii.

ECOTEC (1992). *Education and Training of Personnel concerned with Environmental Issues relating to Industry*. Dublin: European Foundation for the Improvement of Living and Working Conditions.

ECOTEC (1992). *The Education and Training of Personnel Involved in the Handling and Monitoring of Hazardous Wastes*. Dublin: European Foundation for the Improvement of Living and Working Conditions.

Engelund, Hanne & Böttcher E. (1995). *EU og uddannelserne - Rapport afgivet til Rådet for Europæisk Politik tilk møde om EU og uddannelsespolitik*. København: Udenrigsministeriet. (in Danish)

European Economic Community - COM 1994. *Vocational Training in The European Community*. Luxembourg: Office for the Official Publications of the European Communities.

European Economic Community, Official Journal No. C 177, 06.07.1988. Resolution of the Council and the Ministers of Education Meeting within the Council on Environmental Education of 24 May 1988.

European Economic Community, Official Journal No. C 193, 20.07.1983. Council Resolution of 11 July 1983 Concerning Vocational Training Policies in the European Community in the 1980s

European Economic Community, Official Journal No. C 277, 31.10.1989. Conclusion of the Council and the Ministers Meeting within the Council of 6 October 1989 on the Youth Card in Europe

European Economic Community, Official Journal No. L 199, 31.07.1985. Council Decision of 16 July 1985 on the Comparability of Vocational Training Qualifications between the Member States of the European Community

European Economic Community, Official Journal No. L 214, 02.08.1991. Council Decision of 22 July 1991 Amending Decision 87/569/EEC Concerning an Action Programme for the Vocational Training of Young people and their Preparation for Adult and Working Life (PETRA)

European Economic Community, Official Journal No. L 340, 29.12.94. Council Decision of 6 December 1994 Establishing an Action Programme for the Implementation of a European Community Vocational Training Policy

European Economic Community, Official Journal No. L 346, 10.12.1987. Council Decision of 1 December 1987 Concerning an Action Programme for the Vocational Training of Young People and their Preparation for Adult and Working Life

EURYDICE (The European Education Information network) & CEDEFOP (European Centre for the Development of Vocational Training) (1995). *Structures of the Education and Initial Training Systems in the European Union*. Luxembourg: Office for the Official Publications of the European Communities.

Gagliardi, Raul & Alfthan, Torkel (1992). *Environmental Training - Policy and Practice for Sustainable Development*. Geneva: ILO - International Labour Office.

Geers, Frederick (1993). National Synopsis of the Situation of Environmental Training in Belgium. *Journal of European Industrial Training*, 17, 10, pp. 15-21.

Handberg, Susi (1993). *Arbejds miljø og renere teknologi i fiskeindustrien*. København: Arbejds miljøfondet. (in Danish)

Handberg, Sussi (1994). *KØN og KRAM*. Vejle: Arbejds markedsnævnet. (in Danish)

Hildebrandt, Eckart (1992). *Industrial Relations and the Environment in the E.C.* Dublin: European Foundation for the Improvement of Living and Working Conditions.

Hildebrandt, Eckart (1994). *Industrial Relations and Environmental Protection in Europe*. Dublin: European Foundation for the Improvement of Living and Working Conditions.

Hoffmann, A. (1992). *Tatsachen über Deutschland*. Frankfurt/Main: Societäts-Verlag.

Hudetz, F.C. (1994/95). Self-Actualization and Self-Esteem are the Highest Order of Incentives. *Small Business Forum*, 12(3), pp. 73-75.

ILO (1993). Labour Education. Special Issue. *Workers' Education and the Environment*. Geneva: ILO - International Labour Office.

Institut für Umweltschutz und Berufsbildung e.V. (1992). *Training discussion papers. Environmental training and further training in the Federal Republic of Germany*. Geneva: ILO - International Labour Office, Training Policies Branch.

IRDAC - Industrial Research and Development Advisory Committee of the Commission of the European Communities.

Kanter, R.M. (1989). The Changing Basis for Pay. *Society* 26(6), pp. 54-65.

Kirco (1994). *Analyse af uddannelsesbehov indenfor virksomheders interne og eksterne miljø*. Fredericia: Kirco (in Danish).

Kofoed, N.M., Petresen, F.B. & Sæbye, U. (1995). *Håndbog om miljø og medarbejderinddragelse - miljøforbedringer, engagement og forankring*. København: Miljøministeriet (in Danish).

Kohler, L. R. (1993). The ILO's Programme of Environmental Training for the World at Work. *UNEP Industry and Environment*. October-December 1993, pp 11-15.

Kohn, A. (1993). Why Incentive Plans Cannot Work. *Harvard Business Review*, September-October, 1993. pp.

Kulik, C.T., Oldham, G.R. & Hackman, J.R. (1987). Work Design as an Approach to Person-Environment Fit. *Journal of Vocational Behavior*, 31(3), pp. 278-296.

Maguire, M., Maguire, S. & Felstead, A. (1993). Factors Influencing Individual Commitment to Lifetime Learning. A Literature Review. Leicester: Centre for Labour Market Studies.

Morris, Linda. (1993). "Linking participants' motivation with preferred learning methods". *Training & Development*. Vol 48 iss 4 apr 1994 pp 68-69

Nitschke, Christoph & Funderich, Kirk (1994). *Occupational structures and profiles in the Federal Republic of Germany in the field of environmental protection in the public service sector with reference to air pollution control*. Berlin: CEDEFOP - European Centre for the Development of Vocational Training.

Nitschke, Christoph (1992). *Occupational profiles and employment structures in environmental protection in the metal and chemical industries*. Berlin: CEDEFOP - European Centre for the Development of Vocational Training.

Noe, R.A. & Schmitt, N. (1986). The Influence of Trainee Attitudes on Training Effectiveness: Test of a Model. *Personnel Psychology*, 39, pp. 497-523.

Renner, Michael (1991). *Worldwatch Paper 104 Jobs in a Sustainable Economy*. Washington, D.C.: Worldwatch Institute.


Sellin, Burkart (1991). *The EU-programme "Comparability of vocational training qualification": aims, working methods, evaluation*. Berlin: CEDEFOP - European Centre for the Development of Vocational Training.

Simmons, Steve & Øland, Jens Stampe (1992). *Workplace Assessment*. Dublin: European Foundation for the Improvement of Living and Working Conditions.

Sørensen, Claus Primdal (1993). *Klogskaben bor ikke i ét hus alene - medarbejderinddragelse og renere teknologi*. Aalborg: Aalborg Universitetscenter (Skriftserien nr. 113) (in Danish).

Ulhøi, John P., Madsen, Henning & Rikhardsson, Pall M. (1996). *Training in Environmental Mangement - Industry and Sustainability: Corporate Environmental and Resource Management and Educational Requirements*. Dublin: European Foundation for the Improvement of Living and Working Conditions.

Wiley, C. (1992). Create an Environment for Employee Motivation. *HR Focus*, 69(6), pp. 14-15.



Annex 1

Educational levels (An EU classification)

The EU has long been working on a system for making educational certificates and qualifications comparable across countries. In 1985, a 5-level system for educational qualifications was introduced by Council decision (*Official Journal* L 199/59, 31.07.85).

Level 1

Training providing access to this level: compulsory education and professional initiation.

This professional initiation is acquired at an educational establishment in an out-of-school training programme, or at the undertaking. The volume of theoretical knowledge and practical capabilities involved is very limited.

This form of training must primarily enable the holder to perform relatively simple work and may be fairly quickly acquired.

Level 2

Training providing access to this level: compulsory education and vocational training (including, in particular, apprenticeships)

This level corresponds to a level where the holder is fully qualified to engage in a specific activity, with the capacity to use the instruments and techniques relating thereto.

This activity involves chiefly the performance of work which may be independent within the limits of the relevant techniques.

Level 3

Training providing access to this level: Compulsory education and/or vocational training and additional technical training or technical educational training or other secondary-level training.

This form of training involves a greater fund of theoretical knowledge than level 2. Activity involves chiefly technical work which can be performed independently and/or entail executive and coordination duties.

Level 4

Training providing access to this level: secondary training (general or vocational) and post-secondary technical training.

This form of training involves high-level technical training acquired at or outside educational establishments. The resultant qualification covers a higher level of knowledge and of capabilities. It does not generally require mastery of the scientific bases of the various areas concerned. Such capabilities and knowledge make it possible in a generally autonomous or in an independent way to assume design and/or management administrative responsibilities.


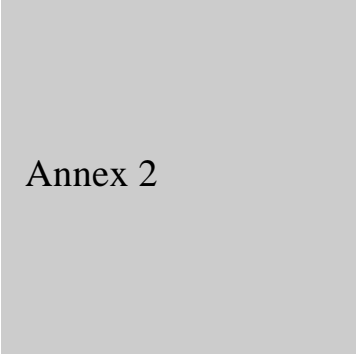
Level 5

Training providing access to this level: Secondary training (general or vocational) and complete higher training.

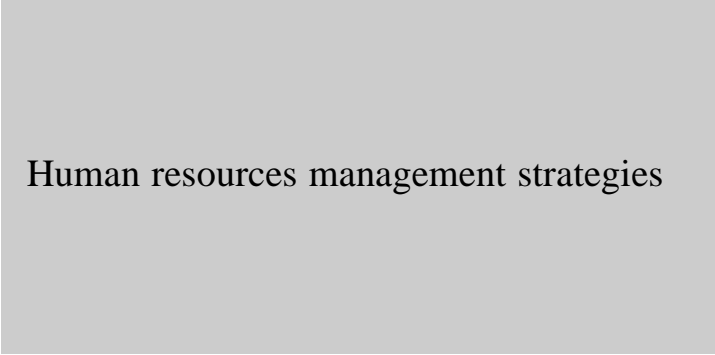
This form of training generally leads to an autonomously pursued vocational activity - as an employer or self-employed person - entailing a mastery of the scientific bases of the occupation. The qualifications required for engaging in a vocational activity may be integrated at these various levels.

As a result of an EU-sponsored project on vocational training qualifications, carried out by CEDEFOP between 1991-93 (Cedefop, 1991), the qualifications acquired in many (19 by February 1994) vocational training courses are now comparable. According to the Danish participant (unofficially) in the project, however, these comparisons are very confusing, because there are so many considerations and so much information to take account of.

In TEM 2, therefore, the above-mentioned scale with five levels will be used. The TEM 2 project involves educational institutions and employees with level 1, 2 and 3 qualifications. In comparison, TEM 1 involved level 5, and TEM 3 will be dealing with level 4. There will, of course, be some overlap between levels at various stages of the TEM project.

Annex 2



Human resources management strategies

Introduction

The main focus of this chapter is on the extent to which HRM-based incentive schemes can support the further development of the environmental training of workers and lower managers. In addition, it will discuss some of the implications of efficient training programmes. It is heavily inspired and influenced by the experiences achieved during the TEM 1 and TEM 2 studies.

Two main types of adult vocational education and training have been identified. The first consists of traditional teaching and learning, and is typically located at specific vocational training centres. The second type is organised and planned, though, in terms of its continuing and educational objectives, it may well be less structured. This type is also found in existing vocational training institutions, however, as well as within individual companies.

One of the basic tenets of economics, as stressed by Bjorkquist and Lewis (1994), is that labour is a factor of production, and that the cost of labour is an investment in 'human capital'. However, individuals are endowed with uniquely different talents, and are motivated by uniquely different sets of beliefs, values, needs, and wants. In other words, no two employees are alike. Moreover, as Maslow has pointed out, the needs of the individual worker also change over time.

Managers and educators should therefore have a more flexible approach to employee motivation. Flexibility, as Buhler (1994) points out, is the recognition that fair no longer means the same. No two employees want exactly the same thing.

During the Tayloristic era of scientific management, workers were seen as just an extension of the machines they operated. Motivations, if considered at all, were primarily of an economic nature.

However, as a result of the pioneering work of Elton Mayo during the 1920s and 1930s, workers were also shown to have non-economic motivations. This paved the way for the human relations movement, which much later evolved into Human Resource Management.

In all societies, culture and such associated factors as social class, gender and ethnicity have been found to have a significant effect on the learning process. Those who have had the longest experience of learning, and who may therefore be considered to have gained the most from the system, are also those who will continue to gain the most from the system. Few would confine their idea of education to the period between the start of primary school and the end of secondary school. Rather, it has become more fashionable to see education and training as a lifelong activity (Davies, 1995).

Possibilities and limitations of HRM strategies

Individual commitment to lifetime learning is influenced by, amongst other things:

Motivation

- individuals' motivation to participate in learning activities varies greatly, often - though not entirely - due to differential relationships to the labour market;
- adult participation in formal and informal learning tends to be mainly for work-related or vocational reasons;
- education and training in adult life is often linked with personal interests or hobbies;
- motivations tend to vary according to age and gender;
- reasons for participation often differ according to social class;
- employees often perceive the benefits of training to be job-related;
- previous bad experiences tend to lead to negative attitudes;
- motives to learn vary a lot between individuals and across time, ranging from: (i) the desire for knowledge; (ii) achievement of personal development goals; (iii) achievement of job-related goals; (iv) achievement of social and community goals; (v) fulfilment of external expectations; and (vi) economic needs.

Increasing awareness

Awareness of local educational or training opportunities is often low, and, furthermore, varies according to social class and age. In itself, however, greater awareness will not necessarily significantly increase participation. Evidence indicates that the individual's choice is highly dependent on the availability of opportunities, providers, and employers (Maguire et al., 1993). The indications from this study are that the latter in particular has had the most decisive influence on participation.

Information and guidance

- there is widespread recognition in the literature of the importance of information and guidance for stimulating participation in education and training;



- adults may not always be clear about their learning needs and the relationship of certain courses to their vocational or other goals;
- guidance and assessment are thus extremely important for adult learners, who might also require help in finding and enrolling in relevant courses.
- without such support, there is a risk of choosing wrong or inappropriate courses, with the result that many give up. This is both demoralising for the person concerned and a waste of teaching and training resources.

It is also generally recognised that:

- there are differences in those who use the guidance service;
- employees need guidance, especially those traditionally under-represented in education and training;
- there are fewer dropouts after guidance;
- there are difficulties in "reaching" the unemployed.

Choice and empowerment

- empowerment of the individual has a positive effect on the motivation to learn, as some of the Danish cases have shown;
- the more employees are able to choose to participate in training courses, the more motivated they are to learn and complete the course.

Modern qualifications

In British literature, the emphasis is on the perceived benefits of, for example, finding a job or career advancement, while relatively little attention has been given to the attainment of qualifications. In Germany, on the other hand, the possession of an appropriate qualification is a prerequisite for getting a job (Maguire et al., 1993).

Provider flexibility

- interactive approaches are more positively received by the participants than conventional approaches;
- employee development schemes are effective - "adult learners want intermittent participation in formal study".

Access

- barriers to participation: (funding; fear of loss of job security; finding time to study);
- there are different obstacles to participation for the employed and the unemployed;
- employers dominate access to training;
- participation is related to social class and/or previous education;

- for some workers, lack of basic skills, e.g. reading, writing, spelling or basic numeracy, is an important barrier to participation;
- there are high barriers to women, especially those with dependent children, working class women, and single parents.

Financing

The cost of learning activities is commonly cited as a significant barrier to participation, although non-participants who cited expense as an obstacle often had little idea of the actual cost of learning activities. This could suggest that cost, like lack of time, may be a socially acceptable reason for not participating, obscuring more complex and possibly unrecognised reasons. Nevertheless, it is generally accepted that acceptable funding mechanisms may stimulate greater participation.

Rewards for investment

- for employees, the main measurable benefits of training are improved employment prospects, better pay, and increased job satisfaction;
- for employers, increased productivity following training typically exceeds any increase in pay.

Quality assurance and customer care

It is important to remember that the above-mentioned factors are interrelated. Thus, individuals' motivations to participate in training courses depend on such things as awareness of opportunities, barriers to access, and appropriate guidance and advice.

Practical motivational initiatives

In order to perform optimally, the individual must fulfil a number of 'social' needs in addition to basic needs. Such social needs include the need to belong, to be challenged, to be acknowledged, to express innate talents, and to achieve career goals.

As pointed out by Bjorkquist and Lewis (1994), work is one important activity through which such needs can be met. If these needs are not met, or, worse, deliberately neglected, management's ROI in human capital is likely to suffer.

Direct incentives, such as monetary rewards, are short-sighted and tend to fix employees' attention on the reward itself, which may prove to be counter-productive to morale (Hudetz, 1994/95). Long-term incentives closely linked to company philosophy are better, and, as argued by Hudetz (1994/95), often result in high levels of performance and constitute the highest level of motivation, i.e. intrinsic motivation.

According to Kanter (1989), incentives are only relatively, not absolutely, important. For example, the importance of monetary incentives may sometimes have more to do with how to obtain them than with the exact amount involved.



Nowadays, employees want other kinds of reward than money. The following five tools can be effective incentives to improve performance (Currid, 1995):

- sharing the corporate mission;
- letting employees control their own professional agendas;
- sharing the rewards of value-creation;
- continued learning;
- boosting the reputation of deserving individuals.

Motivational problems could be due to more simple factors, e.g. lack of knowledge about the job's importance, positive or negative feedback about performance, and employees' lack of knowledge of the consequences of their performance.

To further understand the needs of the individual employee, more attention needs to be paid to the worker-environment fit. Kulik et al. (1987) have proposed three important factors for a good worker-environment fit: (i) skill variety; (ii) task identity; and (iii) task significance. These factors, together with the need to belong, to be challenged, to be acknowledged, to express innate talents, and to achieve career goals, have been found to determine the strength of the individual worker's growth need. Thus, according to Kulik et al. (1987), if a job has too little potential to satisfy the individual's need for growth, then the strength of this need will diminish. If, on the other hand, the job has too much potential, it could lead to performance anxiety. The rationale behind the worker-environment fit is that, where there is a bad fit, efforts to improve employee performance, e.g. through training, are misplaced. Rather, efforts should be directed towards improving the fit. In other words, the better the fit, the more effective training efforts are likely to be.

A number of HRM-related initiatives to improve and strengthen the worker-environment fit, in addition to company-paid training, can be suggested. In a recently completed study in a Danish company (1996), a number of shop-floor workers were asked to give their preferences from a list of 32 suggestions (including the possibility of adding others). Some of the most frequent suggestions were (in random order):

- training in more 'soft' and not necessarily job-related areas;
- improved possibilities for flexible working hours and part-time jobs;
- counselling on health issues;
- free coffee and tea;
- better dining facilities (particularly during shifts);
- improved shopping arrangements for personnel;
- more corporate sport activities;
- more social arrangements which include employees' families;
- cottage rental discounts for all employees;
- more evening staff meetings on job and non-job-related issues;
- improved child care programme.

The above-mentioned study shows that improvements that are important to employees do not necessarily require an organisational revolution or a huge investment (when judged by the potential savings from expected greater efficiency).

According to Kohn (1993), a lot of CEOs tend to believe that incentives can solve such problems as inadequate training, rigid hierarchies, inadequate communication, and problems of collaboration, etc. This type of problem cannot be solved merely by introducing a new incentive scheme, of course, but will have to be recognised for what they are, i.e. fundamental organisational problems, and dealt with differently.

A recent Danish study (Kofoed et al., 1995) identified various roles of workers involved in a project for the implementation of cleaner technology:

- Workers as data suppliers
- Workers as data gatherers
- Workers as improvement agents
- Workers as change agents

Workers as suppliers of information was found to be based on a general managerial recognition of workers' role in identifying both environmental problems and good ideas (through, for example, suggestion boxes). This does not imply managerial knowledge or acceptance of workers' hidden resources.

Workers as data gatherers is more or less an extension of their previous role in identifying environmental problems within the company. The development of competence is still fairly limited, however. Here, management typically still draws on workers' existing knowledge.

In their role as improvement agents, on the other hand, workers were found to have substantially extended their competence base. In addition, management clearly indicated a willingness to invest in raising the qualifications of the workforce. Workers were also actively involved in the preparation of the operational solutions.

As change agents, management actively encouraged workers to participate in continuous training and to get involved on an equal basis with the rest of the employees, whether technicians, middle managers, etc., in the development and realisation of more radical solutions to corporate environmental problems.

During the latter stage, there was found to be a need for organisational as well as operational changes throughout the company. The workers clearly demonstrated an ability to function as project managers, managing relations to suppliers and consultants themselves, thus saving valuable time for the performance of new tasks.



Kofoed et al. (1995) observe that hierarchical organisations bear much of the responsibility for the lack of respect and appreciation of shop-floor workers, which acts as a brake on the enthusiasm and motivation for creativity on the shop floor.

Another interesting observation made in the above case study was that industrial 'democracy', in the form of joint committees for management-worker relations and safety, is another explanation for the lack of action in the area of cleaner technology and environment in companies.

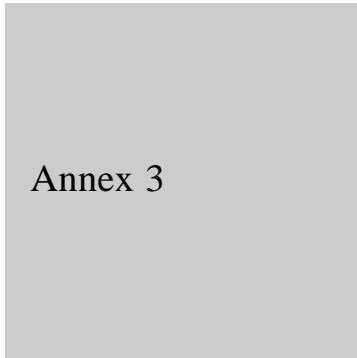
Implications for training strategies

As argued by Buhler (1994), employees are motivated by learning, and should be continuously encouraged and motivated to do so. The role of managers is thus crucial for creating an atmosphere conducive to the learning of new skills.

There is an inherent tendency in the HRM tradition to regard employees as human capital. However, as pointed out by Bjorkquist and Lewis (1994), this tends to focus solely on the interests of the owners. According to this logic, not only do owners or their agents, i.e. managers, have the sole 'right' to determine the nature of training needs, but they are also the best 'equipped' to know what is needed. This completely ignores the fact that workers often have a very good idea of what is needed for them to become more productive. Implicit in this reasoning is also the idea that management's investment in money is far more important than workers' investment in talent, time and emotion.

There is a widespread tradition across countries for keeping vocational and non-vocational adult training separate. Vocational subjects are generally linked with training, which Maguire et al. (1993) see as narrow and associated with the non-transferability of skills. Non-vocational education, on the other hand, is often perceived by participants to encourage self-development.

The success of those organisational changes which often follow the implementation of environmental management systems tends to be critically dependent on the extent to which management sees training not only as an investment to improve the specific skills of the workforce, but also as a means of fulfilling the needs of individual employees in general, and which contributes to an understanding and acceptance of why changes (must) happen.



Methods

Objectives of the data collection

The overall objective of the data collection was to identify leading vocational training institutions and companies as regards environmental performance, both to reveal the present state of the art and to compare the intentions of vocational institutions with the requirements of business organisations. The data collection project was designed with this in mind.

Structure of the data collection

The data collection method was designed in accordance with the overall approach of the TEM 1 study (Ulhøi et al., 1996). In order to identify state-of-the-art vocational training institutions and companies with respect to environmental activities, the data collection was divided into three phases.

Phase I

In Phase I, selected resource persons, especially those at vocational training advisory centres, etc., who could indicate leading vocational training institutions and companies in environmental awareness and training activities, were identified and contacted.

The selection of resource persons was based on existing personal research networks, a survey of participants at recent conferences and workshops, a survey of authors of relevant literature, and organisations and government agencies concerned with industry, education and vocational training, and the environment. In this phase, relevant information collected, but not used, during

the TEM 1 study was included whenever possible and appropriate. This resulted in 285 names in 15 European countries.

Phase II

Phase II involved selecting, contacting, and collecting information from the institutions, etc., named in Phase I. This resulted in a list of approximately 80 vocational training institutions and other providers of training activities in 12 countries which included courses, etc., on the environment. In addition, a number of new companies were identified besides those included in the TEM 1 study.

To begin with, available written material was collected from companies on environmental activities in general and environmental training activities in particular, and from vocational institutions regarding their educational programmes, curricula, and other training initiatives, including environmental subjects. This material was later analysed (see below).

However, it was soon realised, and later confirmed by several of the key informants, that none of the Member States actually had much useful information on, or even an overview of, environmental management education and/or vocational training, either at national or industrial level. This was unexpected, and it was therefore decided to drop the original idea of inter-country comparisons. Furthermore, the material that was collected from vocational training institutions was varied and generally not very extensive. After a reassessment of the study objectives, it was also decided to include more in-depth studies from a smaller number of institutions and companies in just a few countries, in order to give a more complete picture from the individual examples.

Denmark and Germany were selected for this part of the study, for (among others) the following reasons:

- the TEM 1 study showed that Denmark and Germany have a long history of environmental protection and legislation;
- it also revealed that environmental management training differed somewhat in the two countries;
- preliminary investigations showed that Germany and Denmark were among the most environmentally progressive countries as regards vocational activities.

From the list drawn up in Phase I, 13 educational institutions and other providers of environmental courses and 10 companies in Germany and Denmark were selected and invited to participate in the study. This formed the sample for Phase II, in which the subsequent in-depth, semi-structured personal interviews were carried out.

It is important to note that this sample is not meant to constitute a representative sample, from which generalisations about European industry and educational institutions can be made. The sole

intention is to find and describe typical examples of the state of the art in industrial environmental management and business environmental education and related trends.

Phase III

Since the collected material and employee interviews only give a first impression of how employees see the environmental situation of their own company, how their job influences the environment, how they obtain environmental information, how they improve their basic education through courses, etc., and their attitude to environmental matters in general, it was decided to carry out a more general survey.

Due to various budgetary and other practical constraints, it was decided to carry out a structured questionnaire survey of approximately 500 Danish workers who have participated in an environmental course given by the Danish Confederation of Trade Unions during the past five years. The questionnaire was based on the interview guide developed for the employee interviews at the companies visited.

Data collection

The data collection method

In order to provide a broad overview of the situation in EU countries, information was collected from a survey of the literature, available documentary materials (which were generally of a limited and varied nature), and consultations with key persons from industry and vocational training institutions.

In view of the environmental situation in companies and vocational training institutions, the data collection method had to be flexible enough to allow the researchers to follow up interesting leads and issues. On the other hand, some level of standardisation was also needed. This was achieved by a combination of a content analysis of the material received and personal semi-structured interviews. This involved designing both a registration form for the material analysis and (based on the former) interview guides for the interviews.

Developing tools for data collection and data analysis

The material analysis framework had to take account of differences in the information published by vocational institutions, as well as differences between categories of lower management and skilled and semi-skilled workers. However, companies tend to disclose specific information about their environmental activities and initiatives for internal use only, and as such it is regarded as being strictly confidential. Vocational institutions, on the other hand, publish descriptions of environment-related educational initiatives primarily for students and lecturers. The main aim, therefore, to the extent to which it has been possible, was to evaluate the content and form of the information in the case of companies, and record the characteristics of teaching and research activities in the case of institutions.

The company material analysis was based on the same registration form used in TEM 1, since it includes a special section on internal training activities, etc.

A second registration form was developed to analyse the environmental training activities of educational institutions. As regards teaching, the aim is to clarify the main characteristics of environmental educational initiatives at the institution in question. Teaching initiatives are described for a number of parameters, including the type of educational activities, educational approaches and the materials used. This results in a register of environmental management courses and educational approaches.

The main aim of the interviews in the companies was to provide an understanding of how increasing corporate environmental concern, as reflected in training needs and requirements, was perceived/experienced on the shop floor. The interview thus both supplemented - and was supplemented by - the material analysis. Accordingly, the interview guide was divided into nine subject areas, based partly on the structure used for the material analysis, including knowledge of the environmental consequences of their job, special training activities, knowledge of the company's environmental policy, and attitudes to environmental matters in general.

Interviews were generally carried out by two interviewers (a senior researcher and an assistant), using a tape recorder (except for six interviews in a Danish company) and field notes. One interviewer concentrated on asking the questions and guiding the interview, while the other took notes and asked occasional supplementary questions. At the end of the interview round, the field notes and (65) tapes were transcribed on a PC while the interviews were still fresh in the minds of the interviewers. The tapes were then listened to again in order to catch any vital information that might have been missed the first time and to correct any misinterpretations. Compared with "standard" methods, in which interviews are typically carried out by students or other third parties and the transcripts typed by secretaries, this "dual" approach not only increases the validity and reliability of the data, but also optimises the time available. It should be noted that the method used in transcribing the tapes is not "ad verbatim", but transcription by issue, i.e. the respondent's answer to a specific question is registered in shortened form, and not necessarily in the respondent's own words. However, the precise meaning and context of the responses are the same.

As with the material analysis, the interview guide for vocational institutions was divided into environmental-management-related teaching activities, including subjects covered, teaching methods, as well as drivers and barriers.

The interviews with key representatives from the vocational training institutions in Germany (7 interviews) and Denmark (6 interviews) were carried out as taped telephone interviews.

Data analysis

The collected data consisted of annual reports, environmental reports, internal confidential documents, course descriptions, press materials, leaflets, booklets, books, folders, etc.. Two reports were written, one for companies and one for educational institutions. Analysing the

interview transcriptions and the material analysis results, and then structuring the information into groups of issues, produced two syntheses for each report. These two syntheses constitute the actual results of the survey, and are included in condensed form in this report.

The information obtained from the questionnaire survey was analysed using the SPSS statistical program.

Based on an analysis and synthesis of the findings of the previous stages, the final stage of the study involved identifying and assessing the problems and potentials associated with, and discrepancies between, environmentally leading operational practices and lower management and skilled or semi-skilled worker training needs and requirements.

In reading this report, the following should be kept in mind:

- All information mentioned in this report was collected during the project period 1994-1995;
- There is an ongoing development of existing training and education as well as management practices and initiatives;
- All participants have been guaranteed full confidentiality - thus no specific information in the report can be linked to either an individual company or educational institution;
- It is the general policy of the research team not to rank countries, companies or educational institutions according to environmental performance.

European Foundation for the Improvement of Living and Working Conditions.

Training in environmental management - Industry and sustainability
Part 2 - The role and requirements of categories of lower management and workers

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