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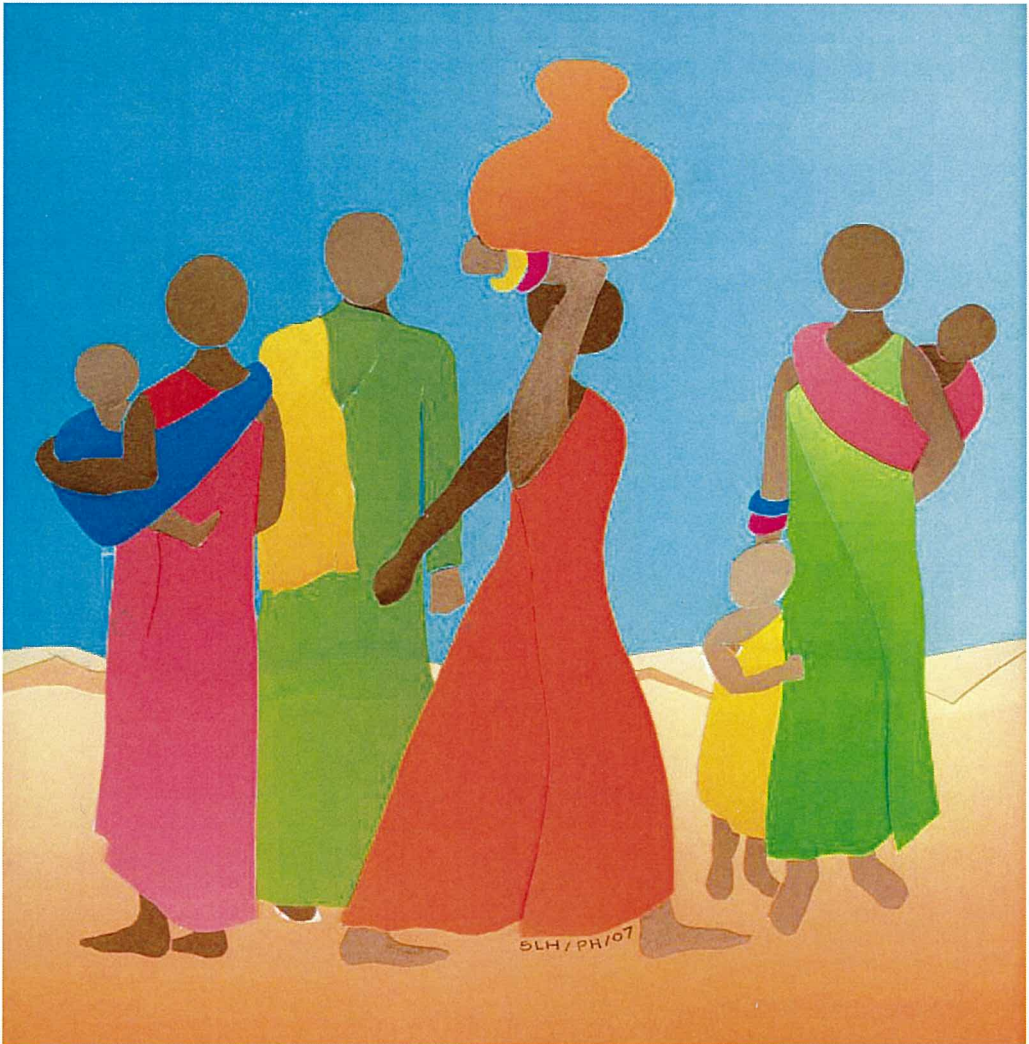
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Environmental Management Systems - a Way towards Sustainable Development in Universities

"It was difficult at first ... then we started talking with our colleagues and we saw it in a longer perspective"



Doctoral dissertation

the international institute for industrial environmental economics

Lund University, Sweden

Environmental Management Systems - a Way towards Sustainable Development in Universities

**”It was difficult at first ... then
we started talking with our
colleagues and we saw it in a
longer perspective”**

Doctoral Dissertation, December 2007

**Kaisu
SAMMALISTO**



Whilst I was finishing my thesis, I asked two, to me, very special and creative people to make a picture for the cover. This resulted in a piece of art created via a paper collage technique, which depicts an African woman, who with determination is carrying water to her family. I see the symbolism in the fact that it requires great determination to change the course of action and achieve sustainable development in the world, to provide the basic needs of clean air, clean food and clean water for everyone, from generation to generation. The fact that the woman is African refers to my background there, while the need for a change is great all over the globe. Accordingly, I would like to thank my sister, Sirkka-Liisa, and brother, Pentti, for their work. The figures in this thesis were also made by Pentti.

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Kaisu Sammalisto

Lund, December 2007

Executive summary

Background

This thesis focuses on the use of environmental management systems (EMS) as a tool to promote sustainable development (SD) in society. Although the economic development in the world today is positive in many aspects, the backside of this development, combined with the growing population, is the increasing negative impact to the environment. For instance, while increased consumption of goods and travelling are available for more and more people around the world than ever before, the negative results of this increased production is the spread of hazardous substances in the ecosystem, around the globe.

Therefore, an increase in knowledge, awareness, motivation, and action competence to achieve more sustainable behaviour in society is an important factor in the strategy to achieve sustainable development. In higher education this means that students need opportunities to see how the subjects they are studying are connected to sustainable development. They will then consequently be able to become ‘sustainability-promoting’ professional and private decisions-makers in the future. Universities need to provide these opportunities and expose students to the questions that are relevant for sustainable development from various disciplinary perspectives.

The basis for this is the idea that education is a key factor in achieving sustainable development and that, correspondingly, higher education has an important role in educating future decision-makers. The need to achieve sustainable development and the role of education to support it, have been expressed in several international policy documents.

The main argument of this thesis is that environmental management systems, which have been implemented in many organisations, including some universities, can function as an effective means to integrate sustainable development in all university activities, including the process of education. These systems provide, in their Plan-Do-Check-Act model, a structure to work also with the indirect aspects¹ and stimulus to integrate sustainable

¹ Environmental aspects are, according to the definitions of the ISO 14001:2004 Standard, divided into direct and indirect aspects. The direct aspects, for example, the use of hazardous chemicals can be associated directly with the organisation’s possibility to control and reduce the environmental impact. The indirect aspects, for example, transport services by an external company, or education of students at a university, can

development, also in education. The regular audits required by a certified environmental management system keep the activities on the university agenda and provide opportunities for follow-up, for feedback, and for further development.

Purpose and research questions

Although there are many studies pertaining to the implementation of environmental management systems in industry and some in public organisations, many features of their use in the university context are still poorly understood. Based on the above, it was deemed relevant and interesting to explore, in detail, the use of an environmental management system in order to shift university activities towards sustainability.

The overall purpose of this thesis is to contribute to the knowledge and understanding of the implementation of environmental management systems in universities and how such systems can be a tool to promote integration of sustainable development in higher education.

The thesis is based on the following research questions:

- 1 *Why do universities work with environmental management systems?*
This question contains the following sub-questions: *What are the main drivers and barriers for the work?* and *Have the Swedish Government Directives been effective in this process?*
- 2 *How do universities work with environmental management systems?*
This question includes the sub-question: *Have the environmental management systems resulted in any improvements in direct environmental impacts in Swedish universities so far?*
- 3 *Can an environmental management system be a way to institutionalise work for sustainable development, including education for sustainable development, in higher education?*
- 4 *What can universities and industries learn from one another in environmental management system implementation?*
This question has the sub-question: *How does implementation of environmental management systems differ in a university-setting versus industry?*

to some extent, not be controlled by the organisation. The environmental impact of indirect environmental aspects can therefore not be fully controlled by the organisation.

Analytical framework

The Environmental Management Systems Directives can be seen as a public intervention, one of the measures by which the Swedish Government will attain its environmental policy objectives. An intervention theory with a map or a model of how the intervention is assumed to work was thus constructed. This model describes how an environmental management system could be utilised to facilitate sustainable development integration within universities. This provided a model for a theory-based evaluation of the effectiveness of the EMS that is also used for structuring the findings. Evaluations of environmental interventions are often quite problematic since environmental problems are very complex, have many sources, and many of them cannot be limited in time or space. It is, however, possible to link the effects of environmental management to sustainable development in a causal chain, where interim markers can be used to evaluate if the intervention is leading to the intended results.

The model of the study, where the Government Directives form the output of the conversion to the universities, can be found in Figure 3-2. The chain of outcomes that are evaluated are the following:

- Outcome 1: Implementation of environmental management systems in higher education
- Outcome 2: Increased environmental awareness of faculty and staff
- Outcome 3: Greening of courses, research and campus
- Outcome 4: Students apply principles of sustainability in their future careers
- Outcome 5: A more sustainable society

Outcomes 1-3 are studied using a number of interim markers, whereas Outcomes 4 and 5 are to take place in the future and, consequently, they cannot be directly evaluated at present. The discussion of the results of the evaluation is considered in two ways, summative and formative: summative assesses the effectiveness of the intervention; and formative discusses the possible ways to improve the effectiveness of the implementation.

Research design and methods

This research resumes the study of environmental management systems (then in small and medium-sized enterprises), which resulted in the author's licentiate thesis of 2001. The studies of environmental management systems

in universities, utilising a number of empirical methods, including the study of historical material, surveys, interviews and case studies, were conducted between 2001 and 2006.

The thesis summarises and discusses the research findings published in five appended papers, which have been selected as the most relevant to the discussion. Papers I, III and IV are co-authored. The Output, the Government Directives and the other relevant drivers for implementing EMS in universities are explored in Paper I. Together with Papers II and V, Paper I provides a contribution to the study of Outcome 1 and the EMS process in universities. They are based on studies of annual environmental reports from all Swedish universities as well as two surveys undertaken amongst all the environmental coordinators and managers in the universities. These studies provide answers to research questions one and two.

Paper III explores the methods of training and communication, in order to study Outcome 2. The results are based on a survey to faculty and staff undertaken at the University of Gävle. The study of Outcome 3 is presented in Paper IV, in which a procedure of classification and explanation of courses and research projects concerning the content/contribution to environment/sustainable development is examined. The results and the experiences of the faculty are studied, based on the analysis of the classification forms and the interviews with selected faculty members. These papers provide contributions to research question three. The contribution to the fourth research question comes primarily from the results of the empirical research, the licentiate thesis, the literature studies and the author's professional experience.

Research findings and conclusions

The main findings of the study are provided as answers to the four research questions. These answers will be shortly addressed below.

Why do universities work with environmental management systems?

This question contains the following sub-questions: *What are the main drivers and barriers for the work?* and *Have the Swedish Government Directives been effective in this process?*

The Swedish Government Directives have functioned as an external 'spark' for most universities to initiate implementation of environmental

management systems (EMS). The Directives have not, however, been a fully effective driver and the actions taken at the various universities are largely a result of internal drivers based on the commitment of management, faculty, staff and students. The presidents and other top-management officials have a key role to play and they are thus instrumental in creating an institutional drive and corresponding culture of change.

The lack of feedback and follow-up from the Ministry of Education has reduced the effectiveness of the Directives as an external driver. The feedback could be improved, for example, by asking the question “How are you working for sustainable development at your university?” to those involved with university management in the annual follow-up dialogues, as based on the appropriation directions. The Ministry could also organise formal audits of the implementation of EMS at universities.

The amendment of the Higher Education Act in 2006 is also likely to prove to be a weak driver, unless it is accompanied by clear requirements to the universities in the form of appropriation directions, and accompanied by follow-up and feedback from the Ministry of Education.

How do universities work with environmental management systems?

This question includes the sub-question: *Have the environmental management systems resulted in any improvements in direct environmental impacts in Swedish universities so far?*

Most universities use the EMS-like structure to support the work; however some of them deviated from this structure, at least in the beginning, by not prioritising their significant environmental aspects as a basis for their continued work. It is apparent that those universities, where a management decision for a certification according to ISO 14001 was made, have had a clearer focus and allocated resources for related activities. Such universities have also, after reaching certification, continued the work with the indirect aspects through classification of education and research for environmental and sustainability-orientated content in an effort to promote education for sustainable development.

There are tangible results pertaining to the work with the direct environmental aspects and many universities can report reduced use of energy and chemicals, as well as reduced waste management costs due to recycling, etc.

Can an environmental management system be a way to institutionalise work for sustainable development, including education for sustainable development, in higher education?

An EMS provides a structure to work with integration of sustainable development in universities. A certified EMS with regular internal and third-party audits provides a system with continuous feedback and follow-up. Training is an integral part of an EMS and is especially important for faculty, in order to stimulate them to see the connection of their own work and particularly in disciplines related to achieving sustainable development.

The connection of education and research to the concept of sustainability, as well as to the tangible environmental activities of the university, however, needs to be clarified further. It is apparent that there has been a problem in clearly communicating the purpose and role of the EMS in the long-run. EMS and training are sometimes seen as solely an aim in itself, based on a command from management.

As the work with indirect environmental aspects develops, other dimensions of sustainability may get greater attention. Education and research are important activities, where universities can make a major contribution to sustainable development in the long run. Although the future results of the content related to environmental and sustainability in these activities cannot easily be measured, the level of integration of such content in them can be evaluated. This should preferably be done by the lecturers and researchers themselves, since it provides opportunities for continuous reflection and thus development.

The main challenge lies in getting the discussion pertaining to environmental and sustainability issues to become 'an academic matter'. An EMS can contribute to this by placing sustainability on the agenda, as is demonstrated by the case in industry. But in addition to being on the management agenda, environmental and sustainability issues also need to become part of the academic agenda in higher education, taking the focus from the EMS itself and making sustainability a part of the role of academia and its development for the future.

Here the results of the emerging scientific studies pertaining to sustainable development in different disciplinary contexts can make a contribution to the discussion of the issues amongst colleagues and students. The learning of students, from the beginning to the end of their studies, can also be explored, for example by using survey and interview techniques.

The often 'lonely' function of environmental coordinators and managers could be developed further, along with top management support, to utilize their function as knowledge banks and brokers for sustainability in their universities and in the society surrounding them. This then could be based on their experiences with the EMS and its structured way to work. Today networks with colleagues at the home university and at other universities contribute by providing support and opportunities – to share experiences.

What can universities and industries learn from one another in environmental management system implementation?

This question has the sub-question: *How does implementation of environmental management systems differ in a university-setting versus industry?*

Universities can learn from industry regarding how to implement a more structured way to work, and that even when initiated from outside, an EMS does not need to be a threat to academic freedom. Follow-up and feedback can also provide opportunities for academic reflection, if seen as an opportunity, rather than a form of control.

The more interactive training forms, active discussion and a critical approach to sustainable development can be a contribution from universities to companies. The different disciplinary perspectives can open opportunities for companies to work with the wider concept of sustainability, including also the economic, social and cultural aspects, which are still rather unfamiliar to many companies.

With the lack of traditional market incentives (such as customer requirements) there are, compared to industry, few incentives for the management body of a university to work to achieve sustainable development. Instead the work must rely on their personal engagement and occasional pressure from students, who through their demands can initiate and support change. Although there are some good examples, a limitation of the students acting as a driving force is the fact that their engagement is limited to the time of their studies at the university. This period is often not long enough to make a significant contribution to the institutionalisation of the work. There are also considerable variations in the student engagement from one 'batch' of students to another. As the need of sustainable development becomes more apparent in society, students well-versed in sustainable development will play an important role.

The success factors for EMS implementation in university can be summarised in generic terms as follows: (i) top-management commitment, (ii) relevant resources for implementation and maintenance of the EMS, (iii) team work at different levels of the organisation, (iv) communication, (v) environmental training, (vi) follow-up and feedback, and, (vii) internal and external audits. These equal the factors for successful implementation of EMS in industry, although awareness and sensitivity of the special conditions pertaining to the implementation of an EMS in an academic context are also required.

Recommendations to stakeholders

For the decision-makers on the national level, it is important to provide some drivers to university managements, if real change for sustainable development is intended. If positive monetary incentives cannot be provided, follow-up and feedback give incentives via encouragement, as it becomes obvious that planned positive changes have taken place or, in the opposite case, that a change of direction and improvement is needed. This can constitute necessary incentives, even within a far reaching delegation.

Decision-makers in universities, as well as in various regional and local authorities, can also have advantages related to follow-up and feedback, as stated above. Peer-reviews, a well-accepted method of scientific evaluation of research, have many similarities to the administrative audits of a management system. They both pay attention to content and form. A focus on the similarities, for example the feedback for improvement, and further development of audits in an academic context, can improve acceptability in academia.

Those working with implementation of various policies in universities can learn from the method of evaluation used in this study, which has many similarities to management system audits. They also need to ascertain the support of top management *prior* to their commitment to implementing changes and making use of the support and experiences of their colleagues in various networks.

The following recommendations for the implementation of ISO 14001, which can contribute to education and research for the sustainable development, can be made based on the case university:

Before implementation

- Take a certification decision to the highest level, for example adopted by the University Board and include the aim of sustainable development already in the beginning, for example in the University's policy.
- Appoint a faculty member as the management representative for the EMS process with resources to engage others in the activities that are common to the whole university.
- Have all departments and students appoint their representatives in an Environmental/Sustainability Council.

During implementation

- Ensure and allow time for good communication by having the management representative report directly to the President, using various meetings to discuss the EMS process with faculty and staff, and by organising theme days, breakfast meetings, etc., about environmental and sustainability issues in cooperation with local industry and NGOs.
- Provide a 'compulsory' basic environmental training for the whole university Management Group, the department heads, the Environmental Council, as well as all faculty and staff. This should include special training pertaining to legal requirements for those concerned and for internal auditors.
- Assure that the responsibilities based on the EMS are clearly delegated within the organisation, for example the training of faculty and staff to each department head. The central project leader is responsible for coordination and support.

After certification

- Appoint a senior faculty member as the management representative, and if necessary, have another function responsible for the maintenance and development of the EMS.
- Move the focus gradually to the wider concept of sustainability in various forms of communication.
- Continue the basic training for new members of faculty and staff and provide 'update' training regarding legislation, and internal auditing for those concerned.
- Continue the regular internal and, if certified, third-party environmental audits.

The problems observed during the implementation of ISO 14001 at the case university could be summarised in the following points:

- The problems caused by a lack of relevant environmental data and the unclear allocation of environmental responsibilities between different departments and the landlord required time to solve.
- The scepticism regarding the EMS implementation and various persons both wanting and not wanting to be told ‘exactly what to do’ was apparent in some departments.
- Audits and routines were seen as a form of control, and consequently limiting the general ‘rule’ of academic freedom.
- The student involvement has varied greatly, between years.

Contributions of the research

This study provides empirical data and analysis relating to the implementation of EMS, in order to support integration of environmental and sustainability concerns in higher education in Sweden. It evaluates, in more detail, examples of methods for training, communication, and working with indirect aspects in institutions of higher education.

This study contributes to the limited number of detailed early evaluations regarding environmental interventions and it demonstrates a way to assess the effectiveness of a government directive, and an environmental policy, and how they can contribute to achieving sustainable development within a society. It also describes a method to assess the progress of intangible, environmental and sustainability impacts with interim markers utilising multiple sources of data methods and collection.

The study also contributes, by comparing industry and universities, to the understanding of how an EMS is implemented and maintained in different types of organisations.

Suggestions for further research

It would be interesting to further analyze how students develop their knowledge and awareness as to how to achieve sustainable development during their study periods at a participating university. A comparison could be made between students in programs with and without intentional sustainability integration, as well as between different universities.

Another interesting area for further research would be the work with education for sustainable development in universities following the initial, and often intensive, implementation phase of environmental management systems.

It could also prove helpful to study the drivers and barriers at different institutions and compare the outcomes. This would provide knowledge and understanding, based on the following question: why did it turn out like this? An example of this could be to make a more detailed study of the EMS Directives of the Swedish Government, its background, and the related processes to achieve the output.

Table of Contents

LIST OF FIGURES	IV
LIST OF TABLES.....	V
LIST OF PUBLICATIONS INCLUDED IN THE THESIS	V
ABBREVIATIONS	VI
1. THE GLOBAL CHALLENGE.....	1
1.1 SUSTAINABLE DEVELOPMENT (SD)	1
1.2 EDUCATION FOR SUSTAINABLE DEVELOPMENT (ESD)	2
1.3 ENVIRONMENTAL MANAGEMENT SYSTEMS	7
1.3.1 EMS in the public sector	9
1.3.2 The Swedish EMS Directives	10
1.3.3 EMS in universities	12
1.3.4 EMS in the academic context	12
1.4 FROM INTEGRATING ENVIRONMENT TO INTEGRATING SUSTAINABLE DEVELOPMENT	14
2. PURPOSE, SCOPE AND OUTLINE.....	17
2.1 FROM EMS IN SMEs TO EMS IN UNIVERSITIES	17
2.2 PURPOSE	18
2.3 SCOPE AND LIMITATIONS	19
2.4 THE SWEDISH HIGHER EDUCATION SYSTEM	20
2.4.1 The University of Gävle.....	21
2.5 THE INTENDED AUDIENCE.....	21
2.6 OUTLINE OF THE THESIS	22
2.6.1 The Licentiate Thesis.....	22
2.6.2 EMS – a way towards sustainable development in universities	23
2.6.3 Papers appended to the thesis	23
2.6.4 Related papers and publications (not included in the thesis)	24
3. ANALYTICAL FRAMEWORK.....	27
3.1 PUBLIC INTERVENTION	27
3.1.1 Studying an intervention.....	27
3.1.2 Evaluation	28
3.1.3 Evaluation criteria.....	29
3.1.4 What is evaluation research?.....	30
3.1.5 Evaluation of an environmental intervention	30

3.1.6	<i>Theory-based evaluation research for studies of EMS</i>	32
3.2	THE MODEL FOR THE STUDY	32
4.	METHODS	37
4.1	GENERAL CONSIDERATIONS FOR THE OVERALL STUDY.....	37
4.2	METHODS USED IN THE LICENTATE RESEARCH.....	38
4.3	METHODS USED TO STUDY EMS IN UNIVERSITIES.....	41
4.3.1	<i>Why are universities implementing EMS</i>	41
4.3.2	<i>How are universities working with EMS</i>	45
4.3.3	<i>Institutionalisation of sustainable development</i>	52
4.3.4	<i>Industry and universities</i>	54
4.4	METHODOLOGICAL CHALLENGES REVISITED	55
4.4.1	<i>Basing information on environmental coordinators</i>	56
4.4.2	<i>Choice of case studies</i>	57
4.4.3	<i>Action research</i>	57
4.4.4	<i>The background of the researcher</i>	60
5.	RESULTS	63
5.1	GOVERNMENT DIRECTIVE AND OTHER DRIVING FORCES	63
5.2	EMS IMPLEMENTATION	66
5.2.1	<i>Environmental coordinators</i>	67
5.2.2	<i>Working within the ISO 14001 structure</i>	67
5.2.3	<i>Identifying significant environmental aspects</i>	70
5.3	INCREASING AWARENESS AMONG FACULTY AND STAFF.....	71
5.4	INTEGRATION OF ENVIRONMENT AND SUSTAINABLE DEVELOPMENT IN COURSES AND RESEARCH PROJECTS	75
6.	DISCUSSION	79
6.1	WEAK AND STRONG DRIVERS	79
6.1.1	<i>Weak directive</i>	79
6.1.2	<i>University management has a key role</i>	80
6.1.3	<i>Importance of feedback and follow-up</i>	81
6.1.4	<i>The role of environmental coordinators</i>	82
6.2	IMPROVEMENTS IN DIRECT ASPECTS	83
6.3	INDIRECT ASPECTS IN CORE BUSINESS.....	84
6.4	EMS – A STRUCTURE FOR INSTITUTIONALISATION	84
6.4.1	<i>Training to see the SD connection to own tasks</i>	85
6.4.2	<i>Differences between departments</i>	86
6.4.3	<i>Small steps in integration</i>	87
6.4.4	<i>Lack of definition may be an opportunity</i>	87
6.4.5	<i>From EMS to ESD</i>	88

6.4.6	<i>How to assess ESD?</i>	88
6.5	IMPLEMENTATION OF ISO 14001 IN INDUSTRY AND AT A UNIVERSITY	89
6.5.1	<i>EMS in small and medium sized companies</i>	89
6.5.2	<i>EMS at universities compared to industry</i>	91
6.5.3	<i>Success factors for the implementation of ISO 14001</i>	94
6.5.4	<i>Problems observed during the implementation of ISO 14001</i>	96
6.6	USING THE ANALYTICAL FRAMEWORK.....	96
6.7	A MODEL FOR EDUCATION FOR SUSTAINABLE DEVELOPMENT.....	97
7.	CONCLUSIONS.....	101
	RECOMMENDATIONS TO STAKEHOLDERS.....	104
7.1	CONTRIBUTIONS OF THE RESEARCH.....	107
7.2	SUGGESTIONS FOR FURTHER RESEARCH.....	107
	REFERENCES	109
	APPENDIX A – SURVEY: DRIVERS AND BARRIERS IN THE ENVIRONMENTAL MANAGEMENT WORK IN UNIVERSITIES	121
	APPENDIX B – SURVEY: CONNECTION BETWEEN EMS AND ESD.....	122
	APPENDIX C – SURVEY: ENVIRONMENTAL COMMUNICATION, TRAINING AND AWARENESS AT UNIVERSITY OF GÄVLE	124
	APPENDIX D – COURSE CLASSIFICATION FORM.....	128
	APPENDIX E – INTERVIEW: COURSE CLASSIFICATION	129
	APPENDIX F – APPENDED PAPERS	130
	PAPER I.....	131
	PAPER II	151
	PAPER III.....	163
	PAPER IV	177
	PAPER V.....	193
	IIIEE DISSERTATIONS.....	209

List of Figures

Figure 1-1. Illustration of the interaction between the environmental, social, cultural and economic dimensions of sustainable development.	2
Figure 3-1. A system model for government intervention and its evaluation.	29
Figure 3-2. Model for the study of SD implementation and integration in university context via EMS.....	33
Figure 3-3. Flow chart for the study with interim markers in the EMS structure.....	36
Figure 4-1. The spiral structure of action research.....	57
Figure 5-1. Model for study of SD implementation and integration in university context via EMS.....	63
Figure 5-2. Driving forces as reported by universities 1999, 2000 and 2003.....	64
Figure 5-3. The EMS progress as reported by 27 Swedish public universities in 2003.....	68
Figure 5-4. Progress in EMS implementation in Swedish universities in 2003	69
Figure 5-5: Prioritised environmental direct and indirect aspects as classified and reported by 27 universities in 2003.	70
Figure 5-6. Percentage of universities reporting improvements in various direct environmental aspects due to EMS based on replies from 17 (45%) of Swedish universities.	71
Figure 5-7. Awareness of environmental policy and objectives among faculty and staff at the University of Gävle.....	72
Figure 5-8. The personal connection to the environmental activities and the effect of certification for the faculty and staff at the University of Gävle	73
Figure 5-9. Motivation and responsibility for the university environmental work at University of Gävle.....	74
Figure 5-10. Areas of daily work where faculty and staff see they can contribute to sustainable development at the University of Gävle.	75
Figure 6-1. Model for Education for Sustainable Development (ESD).....	98

List of Tables

Table 4-1. Relevant situations for different research strategies.....	38
Table 4-2. Annual reports reviewed and survey respondents (2003 and 2006)	43
Table 4-3. Overview of some main research methods employed.....	55

List of Publications Included in the Thesis

- Licentiate Thesis: Sammalisto, K. (2001). *Developing TQEM in SMEs' management systems approach*. IIIIEE Dissertations 2001:1. Lund, Sweden: IIIIEE, Lund University. (Available from www.iiiiee.lu.se -> Library -> Publications)
- Paper I: Sammalisto, K. & Arvidsson, K. (2005). Environmental management in Swedish higher education: directives, driving forces, hindrances, environmental aspects and environmental coordinators in Swedish Universities. *International Journal of Sustainability in Higher Education*, 6, 1, 18-35. (Appended to the thesis)
- Paper II: Sammalisto, K. (2004). *From Government Directive to Sustainable Development in Swedish Universities*. Conference paper presented at the EMSU conference in Monterrey, Mexico, June 9-11, 2004 (with minor editorial revisions in June 2007). (Appended to the thesis)
- Paper III: Sammalisto, K. & Brorson, T. (2006). Training and communication in the implementation of environmental management system (ISO 14001): a case study at the University of Gävle, Sweden. *Journal of Cleaner Production*, Available online 28 September 2006. doi:10.1016/j.jclepro.2006.07.029 (Appended to the thesis)
- Paper IV: Sammalisto, K. & Lindhqvist, T. (2007). Integration of sustainability in higher education: A study with international perspectives. *Accepted for publication in Innovative Higher Education*, 32, 4. (Appended to the thesis)
- Paper V: Sammalisto, K. (2007a). *Drivers and strategies for education for sustainable development*. Paper accepted for presentation at the International Advanced Research Workshop on Higher Education and Sustainable Development, HESD, in Maribor, Slovenia, March 29-30, 2007 (with minor editorial revisions in June 2007). (Appended to the thesis)

Abbreviations

AISHE	Auditing Instrument for Sustainability in Higher Education
ECTS	European Credit Transfer and Accumulation System
EMAS	Eco Management and Audit Scheme
EMS	Environmental Management System
EPA	Environmental Protection Agency
ESD	Education for Sustainable Development
HE	Higher Education
HSV	The Swedish National Agency for Higher Education
HU2	Hållbar Utveckling i Högre Utbildning, a network for sustainable development in higher education
ISO	International Standard Organisation
MLUH	MiljöLedare i Universitet och Högskolor, a network of environmental coordinators and managers in universities
NSHU	The Swedish Agency for Networks and Cooperation in Higher Education
R&D	Research and Development
SD	Sustainable Development
Swedish EPA	Swedish Environmental Protection Agency
SME	Small and Medium sized Enterprise
TQEM	Total Quality Environmental Management
UK	United Kingdom
UN	United Nations
UNECE	United Nations Economic Commission for Europe
UNESCO	United Nations Educational, Scientific and Cultural Organization
WWF	World Wide Fund for Nature

CHAPTER ONE

1. The global challenge

The first chapter presents the global challenge to achieve sustainable development and the role of higher education in the support of the necessary changes in society. It also introduces the concept of environmental management systems – as a tool to improve the environmental performance of organisations, and thereby to support sustainable development.

1.1 Sustainable Development (SD)

Humans interact with our environment through various activities. Further, the negative impacts to the natural environment need to be reduced considerably in order to ensure that clean air, water and food is available for everyone on our planet. The World Wide Fund for Nature (WWF) confirms in its Living Planet Report 2006 that we are using the Earth's resources faster than they can be renewed (WWF, 2006). Since 1961 our 'ecological footprint' (i.e. our impact on the planet) has tripled, and is now exceeding by about 25% compared to the world's estimated ability to regenerate. If this trend continues, the capacity of two globes will be needed by 2050 to maintain mankind with the required resources. Thus, reducing our resource consumption will require radical changes. According to the WWF report, much can and is being done, but additional changes required will not be easy.

The ecological system, which constitutes the life support system on earth, forms the basis for the social, cultural and economic systems. The latter systems can be regarded as additional dimensions of sustainability, and as illustrated in Figure 1-1, the economic, social, cultural, and life-support systems interact with each other. This interaction is included in the most familiar and recognisable definition of sustainable development (SD) by the United Nations (United Nations, 1992). Human activities, within the economic, social and cultural systems, are largely responsible for the damage caused to the ecological system. However, humans are also sources of

knowledge, ideas, tools and methods, and in the best of worlds, this capacity can be mobilised to maintain the life support system at a sustainable level.

It may be discussed then if the concept of sustainable development can, or must, be defined in precise terms. Holmberg & Samuelsson (2006) compare sustainable development to the concept of health, which “cannot be defined in precise terms either, and yet, everyone has an idea about what health is and health is important for everyone.” They continue: “Sustainable development can be seen as the health of societies and the planet. If we are concerned about the present development and whether it is sustainable, we instead ask each other: how are we?”

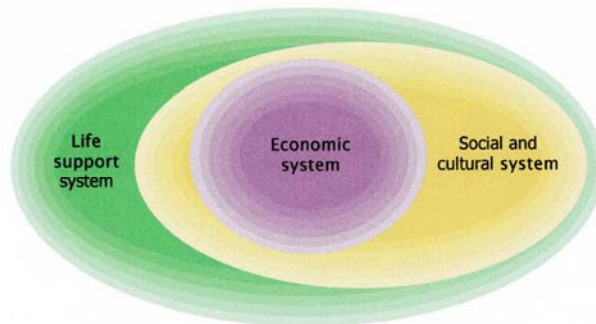


Figure 1-1. Illustration of the interaction between the environmental, social, cultural and economic dimensions of sustainable development.

Source: Modified from Olsson (2005).

What we need to learn more about is how to secure sustainable development. That is, to satisfy the basic needs for all people, without damaging the life support system of our planet (Kates et al., 2001). In this context, institutions of higher education are important by their triple mission: (i) to provide relevant education; (ii) to conduct research; and, (iii) to share information and results with society.

1.2 Education for Sustainable Development (ESD)

In order for a society to shift in such a way to achieve sustainable development, its members need to:

- obtain basic knowledge about why there is a need to change production and consumption patterns;

- understand their individual roles in the change and how they can contribute; and,
- learn how to apply a more sustainable behaviour in their different roles.

The above ideas were first stated by the United Nations in the 1992 Agenda 21 document in Rio de Janeiro and further confirmed in Johannesburg 2002 (United Nations, 1992 and 2002). Both conferences stress the importance of education as a means to reach sustainable development in the long run. As a result of this, the years 2005 to 2014 were declared as the United Nations Decade of Education for Sustainable Development (UNESCO, 2002). To guarantee primary and secondary education is, of course, a major priority in many countries. However, the role of universities in educating future decision-makers for societies should also be seen as essential.

In March 2005, in a meeting in Vilnius, ministers of education from 55 European countries agreed upon a strategy for Education for Sustainable Development in Europe (ESD) (UNECE, 2005). The strategy resulted in an amendment of the Swedish Higher Education Act of February 2006. The act now includes a commitment to sustainable development, and states that: “Universities shall in their activities work for sustainable development, which means that present and future generations are assured to have a healthy and good environmental, economic and social welfare and justice” (Amendment of SFS 1992:1434 February 1, 2006, translation by the author).

Such an adoption, however, may not come easily. The commitment to sustainable development will according to Holmberg & Samuelsson (2006), create many challenges for universities “with their core values of scepticism, curiosity and freedom of speech, and which have a profound role to play in developing students’ qualities to cope with uncertainty, poorly defined situations, diverging norms, values, interests and reality construction”.

What is then education for sustainable development and how can it be achieved? A part of the answer can be found in the ongoing Bologna process within the European Community. The process is based on the Bologna Declaration (Bologna, 1999) and aims at harmonising the educational systems of Europe. It will facilitate for students to move between universities and to account for ECTS credits at different universities. An important tool pertaining to the Bologna process is the requirement of ‘defining’ the learning outcomes of all programs and courses.

It is obvious that sustainable development should, based on the above, be one of the learning outcomes for all university education.

One approach to integrate sustainable development in courses is demonstrated by the following example. In Sweden there is a network for education for sustainable development in higher education (HU2²). It consists of representatives from about 20 Swedish universities, two other European universities, and representatives of the HSV (The Swedish National Agency for Higher Education), NSHU (The Swedish Agency for Networks and Cooperation in Higher Education), and the Ministry of Education. The network received, in 2006, an assignment from NSHU to define learning outcomes for sustainable development. Accordingly, the results of a workshop, in 2007, defined the following common learning outcomes for all educational programs on a basic level³ (Nyström-Claesson & Molander, 2007). The students should be able to demonstrate:

- a holistic view and an understanding of the relationships between different systems, for example, social, ecological and technological systems;
- basic knowledge of sustainable development, that is, vision, concepts, definitions and a description of the state of the world;
- an understanding of the tragedy of the commons; and
- knowledge of different value systems and ethics, to develop a personal attitude, and to see opportunities.

The following examples show some of the additional learning outcomes for three disciplinary areas. All engineers should, on the basic level, be able to demonstrate knowledge of thermodynamics, life-cycle perspectives, and to formulate and solve problems. On advanced levels, students should demonstrate an understanding of how to deal with uncertainty related to decision-making. Depending of their line of engineering, students should learn different types of material and energy balances and flows, etc.

² HU2 network (Högre Utbildning för Hållbar Utveckling; Higher Education for Sustainable Development) www.hu2.se.

³ According to the Bologna agreement Bachelor and Master will be the basic degrees offered in higher education throughout Europe. The basic Bachelor degree includes mainly courses on basic level. The advanced Master level degree offers mainly courses on advanced level. The degree of change required to adjust to the Bologna agreement varies greatly between countries from minimal to quite extensive (cf. <http://www.eua.be/index.php?id=179>).

In addition to the common learning outcomes on the basic level, social science students should be able to demonstrate how social processes interact with sustainable development. On the advanced levels these students should be able to demonstrate, and compare, various theories about relationships between nature and society, for example ecological models. As part of their attitude to sustainable development, students should be able to demonstrate different scientific approaches, and reflect over the meaning of interaction between various forms of knowledge.

Students, specialising in teaching, should, in addition to the common learning outcomes, be able to demonstrate a holistic perspective on sustainability. This includes an understanding about consumption patterns and life style issues, basic knowledge about sustainable development and shared values. On the advanced level, students should demonstrate a more mature attitude and develop competence to take actions. Students should also be prepared to integrate sustainability in different disciplines within a global perspective (Nyström-Claesson & Molander, 2007).

According to Sterling (2004), the integration of sustainable development in higher education can be divided into three levels:

1. *Bolting-on* a sustainability ideal which is added to the existing system. The system itself remains largely unchanged. This is “education *about* sustainability” and can consist of separate courses about sustainability for students.
2. *Reformation* which is a deeper level of response and means “building-in” ideas into existing systems: attempts to green the overall curriculum and university operations. This level, which could be called “education *for* sustainability”, means integrating sustainability issues in regular disciplinary courses.
3. *Transformation* refers to the re-design of university education based on principles of sustainability. This would mean a paradigm shift by which education would be built on learning as change, where the context of learning is sustainability. This could be called education *as* sustainability or sustainable education.

Optional environmental courses, or in some cases full courses and study programs, representing Sterling’s *bolting-on* level, are rather common. To provide a wider perspective to students, some universities in Sweden have compulsory courses in the beginning of the studies (Chalmers University of Technology, The Royal Institute of Technology). There are also study

programs at master's level for those who wish to add on to their previous studies and PhD programs (Lund University, Stockholm University, Uppsala University, etc.).

Reformation aims at creating a connection in the minds of students between the subject in question and sustainable development. Some of the earliest initiatives in Sweden, aimed at greening higher education, were conducted in projects sponsored by the National Council for Renewal of Higher Education from 1992 to 2003. The results of a study from 27 participating universities indicated that positive results could be observed especially for engineering students in the smaller universities. The greening in engineering programs seemed to be spread over a larger number of subjects, whereas in the economic programs greening was limited to the core subjects, namely economics and business administration (Sammalisto, 1999).

A somewhat similar approach using *disciplinary reviews* has been made in the Netherlands. The approach poses an intellectual challenge to lecturers to integrate sustainability in education by “exploring the relationships between various disciplines and sustainable development” to stimulate internal discussion within each discipline (Appel, Dankelman & Kuipers, 2004).

Transformation is the re-design of education based on sustainability principles. This would mean a paradigm change so that education would be built on learning *as* change and education *as* sustainability. In practice, this would mean that the goal of all education would be sustainable development and the different disciplines and subjects would *all* contribute to it. An example of a model for integration in this extent is presented by Juárez-Nájera, Dieleman & Turpin-Marion (2006). They present a framework for a culture where learning is in focus rather than specific knowledge or skills: “Students must learn new and sustainable ways of looking at the world, themselves and their professions.” This requires a radical change on the third level as stated by Sterling (2004) above, where the whole academic culture is changed. Juárez-Nájera et al. (2006, p. 18) continues: “Only when these institutions change their own culture, will students be able to learn how to integrate new ethics, new world views and new ways of collaboration, which belong to the paradigm of sustainability, into their own professional world views and practices.”

Studies of the development of the students' knowledge, values and attitudes concerning environmental issues have been presented by Holt (2003), Lidgren, Rodhe & Huisinigh (2006), and Lundholm (2006). The results

indicate that it is possible to observe a change. A study by Holt (2003) indicates that the discipline-specific modules, “when environmental modules are integrated in corporate and management classes” (p. 329), are more important than general awareness increasing modules. This statement, based on a study of the “impact of education and cultural experiences of business school students during their three years at the University” (p. 331), supports the idea of integration, rather than separate courses. This finding is contrary to practice in many universities, where the main focus has been on establishing general environmental courses, providing an overview of environmental problems, concepts and approaches; rather than linking to a particular field of study.

Although many of the integration models deal with the whole concept of sustainability, most of them focus on related environmental aspects. Ferrer-Balas, Cruz, Segalàs & Sans (2005) discuss the difficulty in this process. After studying keywords used in course descriptions and course objectives at the Technical University of Catalonia since 1997, they have found that 30% of the final theses now have a chapter discussing environmental considerations. Thus, they conclude: “Due to strong impermeability of the curriculum it has not been possible to deeply revise the curricula from a sustainability perspective, only from the environmental one, mainly by adding contents to it.” (Ferrer-Balas, Cruz, Segalàs & Sans, 2005, p. 3).

1.3 Environmental management systems

Standardised environmental management systems (EMS), such as ISO 14001 (SIS, 2004), and the EU Eco-Management and Audit Scheme (EMAS, 2007), and quality systems such as ISO 9000 (SIS, 2000), are examples of modern management concepts that are designed to:

- increase the efficiency of operations;
- put focus on customer requirements; and
- facilitate communication between the organisation and its interested parties.

ISO 14001 was introduced in 1996 and was, at the beginning, mainly implemented at manufacturing companies. The main driving forces for the implementation of ISO 14001 is to satisfy customer requirements, to ensure legal compliance, to improve risk management (e.g. to reduce risk for uncontrolled emissions), to improve public image, to save money and

natural resources (Brorson & Larsson, 2006; Almgren & Brorson, 2003). ISO 14001 and EMAS are built around Deming's 'Plan-Do-Check-Act cycle' and there are only minor differences between the systems. However, one major difference is that EMAS requires the organisation to frequently publish a verified public environmental statement (environmental report). This type of external communication is not mandatory according to the requirements of ISO 14001. Organisations may choose to apply for a third-party certification according to the requirements of ISO 14001 and currently around 140 000 organisations worldwide had achieved the ISO 14001 certification (Peglau, 2007).

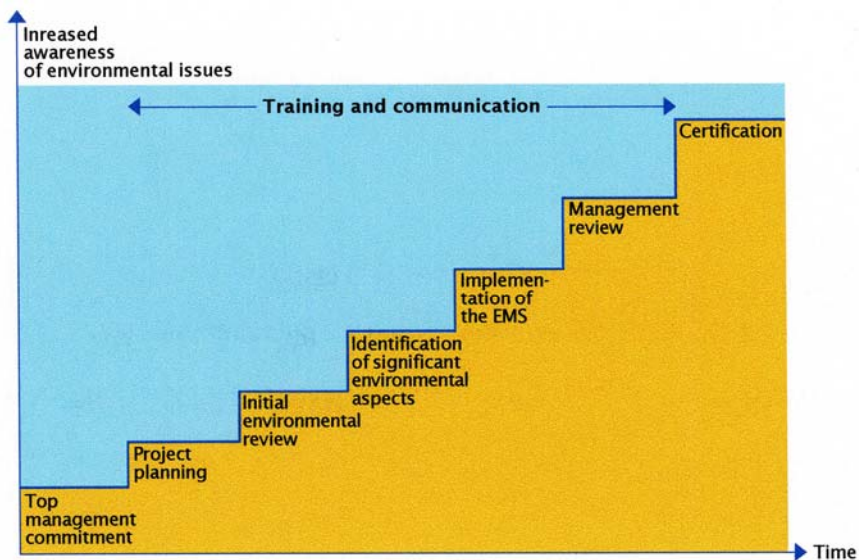


Figure 1-2. Common steps in the implementation of EMS in an organisation.

Source: Brorson & Larsson (2006).

Implementation of the EMS can be seen as a stepwise process (Figure 1-2), in which commitment by management and employees is one of the primary success factors (Daily & Huang, 2001; Summers Raines, 2002; Wee & Quazi, 2005; Zeng, Tam, Tam & Deng, 2005). Motivation at all levels of the organisation is important and therefore training and communication are essential parts of the implementation process. Training and communication serve at least two purposes: to teach people about company policies and everyday procedures, and also to shift the attitudes of individuals and create increased awareness about environmental issues. Typical elements of the

general training for employees include information about a company's environmental policy, relevant environmental aspects, a company's procedures, instructions and non-conformity reporting (Brorson & Almgren, 2007, Rondinelli & Vastag, 2000, Strachan, McKay & Lal, 2003).

In industry, the implementation of the EMS requires minor, or major, changes in existing management practices. For a company that is already certified according to the quality standard, ISO 9000, the shift in culture may be rather limited by the adoption of the EMS. For a company, without any formal management system, ISO 14001 may be a rather big change and challenge. The change processes in industry have been studied from different perspectives. Carlsson (2000) concludes that the problems, barriers and opportunities depend on the approach used for the implementation of the management system. In a study regarding small- and medium-sized enterprises, Sammalisto (2001) observes that the closeness between management and staff, in a small organisation, may be an advantage in the implementation of the EMS.

1.3.1 EMS in the public sector

In Sweden it is rather common in the public sector to implement EMS, but this does not necessarily lead to a third-party certification process. In 2006 there were 14 certified public agencies of a total of about 4 000 ISO 14001 certified organisations in Sweden (Peglau, 2007; Swedish EPA, 2006). For different reasons most of the public agencies have, so far, chosen not to apply for the official certificate. Currently they 'self-declare' the EMS status in their annual environmental management reports to the Swedish Government. However, there is a growing interest to implement EMS within other sections of the public sector and there are currently a number of public organisations (hospitals, public transport organisations, public laundries, etc.) that are certified. EMS at Swedish universities, public agencies, and other public organisations, can in this context, be seen as an example of a tool in society's aim to achieve sustainable development (Cortese, 2003).

Norén & von Malmborg (2004) concluded, in a study of EMS implementation in municipalities, that in spite of the differences in a number of characteristics between the public and private sectors, (including the purpose, goals, financing, norm, etc.) EMS may bring a number of advantages to public agencies. These include, amongst others, a distinct structure, better-defined responsibilities (liability among officers), clearer

information, environmental thoughts implemented in daily work, greater awareness of the environmental issues and simpler communication amongst participants.

In another study, Emilsson & Hjelm (2004) compared the approaches to EMS in municipalities in Sweden and the UK. They concluded that one of the differences between these countries was the fact that more tasks and responsibilities are delegated from the national level to local authorities in Sweden, as compared to the UK. Another difference was the lack of follow-up measures taken by local authorities in Sweden compared to the UK, where EMS implementation was followed-up and discussed by politicians. In Sweden this means that the improvements can remain invisible and, consequently, there are few incentives to take further measures.

In his two studies of EMS in municipalities, Burström von Malmborg (2002) and von Malmborg (2004) states that an EMS is a tool, or a structure, to facilitate cooperation, communication and learning in an organisation. The author concludes that local authorities can function as “knowledge banks”, holding knowledge that they can transfer to companies in their networks; or they can function as “knowledge brokers” helping companies to get in contact with expertise, who can help them to develop their environmental management. Although the above studies focussed on Swedish authorities at the local (municipality, county) level, the results are useful in studies concerning the implementation of EMS in universities. Universities share with other public authorities some common features, typical to governance in Sweden, such as far-going autonomy and limited follow-up by a supervising authority. Concerning implementation of a quality management system, Karapetrovic & Willborn (1999) observed that universities can learn from business companies. Especially since the gap between the markets in which universities and business companies are operating appears to be closing.

1.3.2 The Swedish EMS Directives

Based on the Swedish Government Official Report of 1996, convinced by the need to achieve sustainable development, the Swedish Government appointed all public authorities (close to 240) as role models in the shift towards sustainable development (SOU 1996:112). The annual directives from the Government state that public authorities, in their regular activities, are to integrate EMS, which “should be based on the same principles as those in industry, but adjusted to the activities of the public agency”

(Ministry of Environment, 1996). Although there are no implications that the striving for sustainable development requires an initial process of EMS implementation, this process can serve to create structure for the work. Aiming at certification can serve as an intermediate goal in this process, by laying focus on the issues, getting the work started, getting resources allocated and priorities established for the work.

According to the Directives, public agencies should implement the core elements of the EMS. That is, to identify significant environmental aspects, to establish an environmental policy as well as related environmental objectives. ISO 14001 was recommended as a template, but the Directives did not require any third-party certification. Three universities (and part of a fourth one) were certified according to ISO 14001 by the end of 2005 (Swedish EPA, 2006, p. 70). The implementation of EMS is, since the start of the program, followed-up by annual environmental management reports, which are sent to the Swedish Environmental Protection Agency (Swedish EPA) and to the supervising authority of the public agency (Ministry of Environment, 2000, 2001c-d, 2002). Consequently, most universities send the report to the Ministry of Education. Two universities were amongst the first to be chosen as authorities to represent different types and sizes of organisations. They also had, themselves, shown interest in participating in the project. Later on, another 33 of the total of 38⁴ universities, with about 330 000 students and about 50 000 faculty and staff, participated in the assignment (SCB, 2003). The five arts and sports universities were considered to have fewer environmental impacts and are therefore only obliged to implement a simplified EMS (Ministry of Environment, 2001a-b). According to the Directives, the systematic approach to environmental issues may later on be expanded to also include other aspects of sustainability; that is, social, ethical and economic issues (SOU 1996:112).

⁴ This number includes the following categories that are usually included in higher education and called universities in English in Sweden: universities (universitet), colleges with the right to examine doctors (högskolor med vetenskapsområde), other colleges (övriga högskolor) and artistic colleges (konstnärliga högskolor) (SCB, 2007). Three artistic colleges, which according to the present categorisation should be included in the list, were not among the universities that received a Directive about EMS. The same applies to the three private universities in Sweden.

1.3.3 EMS in universities

In higher education, the level of work with sustainable development varies from mere formulations of policy statements, through various levels of integration in selected activities, to a total reform of the university system. There are many examples and case studies that demonstrate that universities are improving their environmental performance, for example, by reducing their waste and/or evidence depicting energy savings (Leal Filho, MacDermott & Pidgham, 1996; Leal Filho, 2000a, b, c; Delakowitz & Hoffmann, 2000; Herremans & Allwright, 2000; Noeke, 2000; Carpenter, 2002; Viebahn, 2002; Fisher, 2003; von Oelreich, 2004; Price, 2005; Koester, Eflin & Vann, 2006). In many cases, there are also economic benefits coming from these environmental savings.

There are also several studies pertaining to calculations of ecological footprints for universities (Flint, 2001; Venetoulis, 2001; Segalàs, Ferrer & Carrillo, 2004; Ruy & Brody, 2006). However, the initiatives to promote sustainability in higher education, which are commonly based on the vice-chancellor, or president, signing a statement for the entire university, have so far had little impact on the education as such (Wright, 2004). To broaden the perspective, the environmental management system could be seen and utilized as a tool for systematic integration of sustainability aspects in the education and research processes, as well as offering a structured approach to reduce the environmental impacts at campuses.

The problem of weak connection between statements, policies and practice is reported in a number of case descriptions. Segalàs, Cruz & Mulder (2004), who have studied the Technical University of Catalonia in Spain, Delft University of Technology in the Netherlands and Tecnológico de Monterrey in Mexico (ITESM), conclude that these universities were early in adopting environmental policies, and have had ambitious plans also to include elements of sustainable development, including values. Due to various reasons however, these ambitions remain to be fulfilled and what is offered today are a number of ‘greened’, mostly environmentally-focused courses, together with some optional courses.

1.3.4 EMS in the academic context

Most Swedes consider themselves already to be quite environmentally aware. Consequently, there is little resistance to gain acceptance or adoption of environmental efforts. However, the implementation of an environmental

management system at your personal workplace, or university, is often a different issue. The EMS standard requires a clear and documented organisation and responsibilities, documented instructions and procedures including those for follow-up and reporting. On the other hand, academic organisations are characterised by collegial decision-making (Bowen & Shapiro, 1998; Fritzell, 1998; Ramsden, 1998).

At the same time, the academic organisations have, in some areas, a limited interest in formal procedures, while in other areas, such as selecting and appointing professors, they are characterised by a very high degree of formality. The collegial approach to taking decisions may result in a non-transparent process and an unclear chain of responsibility (Högskoleverket, 2001). In addition, the president and academic leaders do not have the same kind of executive power as managers in business companies. This will certainly have an effect on the implementation of EMS in universities (Sammalisto, 2003). The management system must therefore be applied under the circumstances that prevail in the academic world.

Although the change caused by the environmental management system is not radical, it is likely that the new approach and routines will meet resistance. Sharp (2002) focuses on potential problems in the university context, such as the need of questioning and changing of the established mental models, different disciplinary cultures, and other irrationalities. The author calls for greater understanding of the university culture for a change, such as EMS implementation.

The system for higher education is rooted in deep traditions and a number of driving forces will be needed in order to get the concept of “education for sustainable development” accepted. The driving forces for the change indicate that the way the process is driven and accepted, and the barriers can again reflect the possible problems in acceptance. Some studies regarding the needed drivers and preconditions have been presented, for example, by Mulder & Jansen (2006, pp. 69-73), Hopkins & McKeown (2006, pp. 33-34) and Martin, Dawe & Jucker (2006, p. 65). Their conclusions can be summarised as follows:

- All input from the outside world can be perceived as a threat to academic freedom in a university. Sustainable development is perceived as irrelevant.
- There are limits set by the disciplinary culture and a lack of knowledge, awareness, expertise and resources concerning sustainable development.

- The right timing and support from outside the university, especially ministries of education, is essential. The national sustainable development efforts need to be coordinated.

Other authors, who have studied the barriers and success factors for integration, are for instance Sammalisto & Arvidsson (2005), Segalàs, Ferrer-Balas & Mulder (2005) and Lidgren, Rodhe & Huisinigh (2006). They point to problems such as lack of commitment from top management, and the lack of follow-up routines, the failure to recognise and accept the notion of environmental and sustainability problems, as well as limited time and resources and the prevailing academic culture.

Herremans & Allwright (2000) and Price (2005) conclude that success factors include, in particular: (i) active and visible support from top management, (ii) a full-time appointed coordinator to lead the work, (iii) a “spark” to start the process, and, (iv) an appropriate approach to faculty. According to Clarke (2006), it may be beneficial to have two environmental polices: one for administrative purposes and one for academic functions. Finally, it is important to remember that for the promotion of sustainable development in higher education, it may be required to implement a continuous dialogue to shape and reshape ever-changing situations and conditions (Wals & Corcoran, 2004).

1.4 From integrating environment to integrating sustainable development

As shown in the previous sections, there are several investigations and case studies addressing the implementation of EMS in industry and at universities. The management of direct environmental aspects, and the identification of barriers and drivers for the implementation process, are the main themes for many of the studies. In addition to that, a number of key indicators have been developed, by standardisation organisations and networks, to monitor environmental performance and management performance. From scientific studies, published environmental reports, and monitoring results, it can be concluded that the EMS generates, in most cases, improved environmental performance and a more systematic approach of environmental issues. Noting this, the question still remains whether EMS in industry contributes to sustainable development in society, and how do we monitor that. The same questions can, of course, be applied to EMS at universities.

Currently there is limited information about the possible links between EMS and sustainable development at universities. However, since the introduction of the UN Decade for Sustainable Development, research has become more varied and is now dealing with analyses of policies and approaches for sustainable development (Corcoran & Wals, 2004). For example, efforts to measure sustainability in higher education across institutions was analysed by Shriberg (2004). The author concludes that:

- Most tools assess environmental issues and eco-efficiency.
- Many tools gather process-oriented information on campus management.
- Most tools help to create a platform for strategic planning since they help to identify important issues and methods, and to set and reach prioritised sustainability goals.

The need to institutionalise sustainable development in universities, beyond models and single course approaches, is becoming more and more pronounced. The role of EMS, as a tool for integration of sustainable development in university activities, has not been studied in detail so far, and thus empirical material is quite limited. The ambition of this thesis is therefore to contribute to increased knowledge about methods for the implementation of EMS at universities, the results of the management system, and how the EMS contributes to sustainable development. The studies on EMS in universities reflect the author's previous studies on corresponding topics in manufacturing companies.

2. Purpose, scope and outline

2.1 From EMS in SMEs to EMS in universities

Environmental management systems (EMSs) were first introduced in the 1990s and were immediately met by a considerable interest in industry and amongst various stakeholders interested in environmental protection. There was also an early debate about various features of EMSs: Are they suitable for any type of company? Can they be combined with other management systems? Considering the author's experience working with the industry sector, it was curious to enter into research pertaining to EMS. Thus, the doctoral studies began with research that resulted in the Licentiate thesis 'Developing TQEM in SMEs. Management systems approach' (Sammalisto, 2001). The Licentiate thesis was an empirical study of how a previously implemented quality management system would affect the implementation of an environmental management system (EMS) in small and medium-sized enterprises (SMEs).

In December 2001, the same year as the Licentiate thesis was presented, the author, who had the position as the Dean of Environmental Management and Education at the University of Gävle, was appointed to lead the ISO 14001 certification process at the University of Gävle. Thus, it became natural to study the implementation of EMS to higher education. This type of study was also very much needed as there were hardly any evaluation studies of EMS in institutions of higher education at the time. There were also few deep case studies regarding the implementation of systematic environmental agendas in such organisations. As such work was likely to be useful for various stakeholders, including the Swedish Government, the need for learning from available experiences and following the development was evident.

Observations and experiences, which were made in the Licentiate thesis, provided the background for the planning and scoping of this doctoral thesis. Based on the experience of the Licentiate thesis, it was, (in addition to

the study of the process of implementing an environmental management system in the context of a university) also interesting to pose the following question: Can universities learn something from industry, and can industry learn something from universities, regarding the implementation of environmental management systems?

An important development for this study was the publication of the Swedish Government Directives on environmental management systems in the public sector. In this thesis, these directives will be analysed as a government intervention.

Third-party certification was not part of the directives, however, in December 2001; the Board at the University of Gävle made a decision to start the certification process for the university. The Board aimed to provide a tangible and intermediate goal for the university's environmental work, by achieving ISO 14001 certification by 2004. This decision provided the author the opportunity to undertake an in-depth study of the implementation of ISO 14001 within in a university context.

The concept of sustainable development was, from the beginning, already a part of the process. However, the environmental dimension initially dominated the process. Being part of the change process, the author was given many opportunities for increased understanding regarding the particularities pertaining to different disciplinary contexts, and the role of the concept of sustainable development within various university curricula. When the Swedish Higher Education Act was amended in February 2006, with the inclusion of a requirement concerning sustainable development, it became interesting to study how the new requirement would be connected to the previous work with EMS in Swedish universities.

2.2 Purpose

The overall purpose of this thesis is to contribute to the knowledge and understanding of the implementation of environmental management systems in universities, and how these systems can be a tool to integrate sustainable development in the agenda of in higher education.

The thesis is based on the following research questions:

- 1 Why do universities work with environmental management systems?*

This question contains the following sub-questions: *What are the main drivers and barriers for the work?* and *Have the Swedish Government Directives been effective in this process?*

2 *How do universities work with environmental management systems?*

This question includes the sub-question: *Have the environmental management systems resulted in any improvements in direct environmental impacts in Swedish universities so far?*

3 *Can an environmental management system be a way to institutionalise work for sustainable development, including education for sustainable development, in higher education?*

4 *What can universities and industries learn from one another in environmental management system implementation?*

This question has the sub-question: *How does implementation of environmental management systems differ in a university setting versus industry?*

2.3 Scope and limitations

The study focuses on the implementation of environmental management systems at Swedish universities, and the impact of the Swedish Governmental Directives, and other driving forces, on the implementation processes.

The ambition was to touch the whole concept of sustainable development; however, the main focus has been on its environmental dimension.

The scope was limited to institutions for higher education in Sweden, but an international perspective was achieved via an extensive literature study. These international experiences are considered relevant also for Sweden, as the preconditions affecting the implementation process of a management system in an academic context are similar. For example, the disciplinary focuses are comparable to those in other countries.

Any study like this is also limited by the difficulty to precisely define the multi-factorial and complex concept of sustainable development and must take into consideration that various people will have somewhat different ideas about what sustainable development means. Consequently, definition of the content of the four dimensions of sustainability; environmental, social, cultural and economic, based on common definitions has been left

for the individual lecturers and researchers as they have classified their courses and research projects.

2.4 The Swedish higher education system

From being ruled in detail by the National Government, the Swedish university reform of 1993 gave universities greater autonomy in their internal matters, including profiles for undergraduate education. The Government is responsible for the overall considerations of the educational policy, but as long as the objectives set in dialogue between the Government and a university are met, the means to achieve them are relatively free (SOU 2000:82).

Most of the Swedish universities, 35 out of 38 (cf. footnote 4), are public and are managed by objectives and results specified within the frame of the annual budget process. This means that the Parliament decides the financial frames for higher education. The Government governs the authorities via appropriation directions⁵ to each of them, in special government decisions, and assignments, such as the EMS Directives, and appoints the president and the board of the universities. Within the budget every university can form its own management system for resource allocation, institutional organisation, internal rules, delegations, student admission, etc. (Prop. 1996/97:141). The agencies report back to the Government via annual reports, which must be divided into activity areas (SOU 2000:82).

All education in Sweden is free of charge for students and is mainly funded by the state budget. Additional funding can be obtained by providing special educational services. Research is funded by, for instance, companies, research councils, foundations, and the European Union. Research funding is separate from the system of basic education, but overhead costs to cover institutional administration, as well as premises and library services, are drawn from such funding before it reaches the research project in question.

Although universities are treated as public agencies and must submit to relevant regulations, it is acknowledged that they have special characteristics and are more complex than most other public agencies. They are

⁵ Appropriation direction (called 'regleringsbrev' in Swedish) sets out the goals the agency is to achieve, how much money it has at its disposal and how the money is to be divided among the main activities.

characterised by a collegial ‘self-management’ and have a multitude of objectives in education, research and cooperation with society. Many universities are also special due to their size; they involve thousands, and at times tens of thousands of students, faculty and staff (Prop. 1996/97:141; Haikola, 2000).

Swedish universities have a long tradition of annual follow-ups in dialogue with the Ministry of Education based on their appropriation directions. What is not included in the appropriation direction for the particular university does not, accordingly, have to be included in the annual report. Universities are also required by the Swedish National Agency for Higher Education to perform regular self-evaluations, focusing on the quality of education, including how they take into consideration aspects of equity and internationalisation. Before 1997, EMS had mainly been applied in industrial companies. Thus, the Government Directives placed a new kind of requirement on universities in an area where they had no prior experience.

2.4.1 The University of Gävle

Established in 1977, the University of Gävle has expanded rapidly and currently comprises six departments: Business Administration and Economics, Caring Sciences and Sociology, Education and Psychology, Humanities and Social Sciences, Mathematics, Natural and Computer Sciences, and Technology and Built Environment. Together they offer approximately 50 degree programs and 800 elective courses. There are approximately 13 000 registered students at the University of Gävle.

This university is interesting as it has implemented an EMS, which was certified according to ISO 14001 in July 2004. It can, consequently, give insight as to the potential of the formalised implementation of EMS in order to address challenges related to environmental concerns and sustainable development.

2.5 The intended audience

This thesis explores the implementation of environmental management systems in universities and the potential of such systems to contribute to sustainable development. Some comparisons are made to the experiences of the industrial sector. The intended audience may be summarised as follows:

Firstly, the study can be of interest to decision-makers at the national level. It contributes to the, so far, limited number of detailed early evaluation of environmental interventions. The study demonstrates a way to assess effectiveness of a government directive, in this case the EMS Directives. As well as the effectiveness of an environmental policy and how it could contribute to sustainable development. Intervention theory was used as means of making causal relations visible, and the knowledge and understanding of this particular study can hopefully provide an inspiration for similar studies.

Secondly, the study can benefit decision-makers in universities and other regional and local public authorities, where indirect, and in the short-term intangible, environmental and sustainability impacts dominate. It demonstrates how multiple methods and data sources on interim markers can be utilised for early evaluation of policy interventions, also at the local implementation level.

Thirdly, the study can be useful for persons involved in similar implementation processes, such as environmental coordinators and managers at universities. The study provides empirical data and examples of methods for training and communication in an organisation. A way to make sustainable development in education more visible can be useful to the faculty as they discuss sustainable development in their courses, research proposals and educational programs. This can, in the long run, stimulate increased integration of sustainable development in education. While this study of EMS in university context is mainly limited to *Sweden*, the faculty and staff who participated in training, as well as course- and research-project classifications, function under similar conditions within the context of academic discipline. Thus, environmental coordinators and managers in universities outside Sweden could also benefit from the study.

2.6 Outline of the thesis

2.6.1 The Licentiate Thesis

The Licentiate thesis *Developing TQEM in SMEs. Management systems approach* (Sammalisto, 2001) studied the implementation of environmental management systems in small and medium sized enterprises. It was presented in 2001 as a monograph. It is available as pdf document from www.iiiee.lu.se (Library – Publications – Dissertations).

2.6.2 EMS – a way towards sustainable development in universities

The main text of this publication summarises the study of EMS within universities and makes comparisons related to the experiences gained from the research of the Licentiate research. The main text is divided into seven chapters, as outlined below, and supported by additional data located in the appendices.

The background and necessity to achieve sustainable development, as well as environmental management systems, (which function as a tool to provide a structure for environmental activities in universities) are introduced in Chapter 1. The purpose and the scope of the study are defined in Chapter 2. The Swedish university system and the case study university, the University of Gävle, are also presented there.

Chapter 3 provides the analytical framework, *intervention theory*, for structuring and analysing the findings of this study. This chapter also introduces the interim markers for the evaluation of the EMS process, which are essential components of the chosen analytical framework of the study.

The assumptions and methods of the studies are presented in the appended papers, described in detail in Chapter 4.

In Chapter 5, the results of the research are given, structured in line with the interim markers. This is followed by a discussion of the findings in Chapter 6 and the conclusions are reviewed in Chapter 7.

Appendixes A-E contain the questionnaires, forms and interview guidelines used during the studies. Appendix F includes the appended papers, which are marked with Roman numerals I to V. They present, in more detail, the results of the various studies conducted during the research period.

2.6.3 Papers appended to the thesis

The papers listed below will be presented further in Sections 3.2 and 4.3, and are also included in full text in Appendix F.

Paper I: Sammalisto, K. & Arvidsson, K. (2005). Environmental management in Swedish higher education: Directives, driving forces, hindrances, environmental aspects and environmental

coordinators in Swedish Universities. *International Journal of Sustainability in Higher Education*, 6, 1, 18-35.

- Paper II: Sammalisto, K. (2004). From Government Directive to sustainable development in Swedish universities. Conference paper presented at the *EMSU conference in Monterrey*, Mexico, June 9-11, 2004 (with minor editorial revisions in June 2007).
- Paper III: Sammalisto, K., & Brorson, T. (2006). Training and communication in the implementation of environmental management systems (ISO 14001). A case study at the University of Gävle, Sweden. *Journal of Cleaner Production*, Available online 28 September 2006.
doi:10.1016/j.jclepro.2006.07.029
- Paper IV: Sammalisto, K. & Lindhqvist, T. (2007). Integration of sustainability in higher education: A study with international perspectives. Accepted for publication in *Innovative Higher Education*, 32, 4.
- Paper V: Sammalisto, K. (2007a). Drivers and strategies for education for sustainable development. Paper accepted for presentation at the *International Advanced Research Workshop on Higher Education and Sustainable Development, HESD*, in Maribor, Slovenia, March 29-30, 2007 (with minor editorial revisions in June 2007).

2.6.4 Related papers and publications (not included in the thesis)

The purpose of this section is to present selected related research papers and publications, and to explain how they relate to the thesis. These papers, together with previous professional industrial experiences of the author, have substantially benefited the research, however, the relevant information and discussion can be found in the main text of the thesis and the appended papers.

Sammalisto, K. (2007b). *An overview of education for sustainable development in Swedish universities*. This workshop paper provides a mainly qualitative overview of education for sustainable development in Swedish universities at present.

Sammalisto, K. (2003). *Implications of university management and leadership on EMS implementation in Swedish institutions of higher education. A literature study*.

Working paper, which provides understanding of how governance and leadership in Swedish universities may affect implementation of environmental management systems.

Sammalisto, K. (2002a). *Sustainability indicators in higher education*. A working paper with a literature study, which discusses indicators used to assess sustainability in higher education.

Sammalisto, K. (2002b). *MINT – a National Initiative to Promote Greening of the Curriculum*. A conference paper, which describes the work on national level for integration of environmental perspectives in higher education in Sweden.

Sammalisto, K. (1999). *Greening experiences and ambitions as seen by students at some Swedish universities*. The paper presents a quantitative study of students' experiences and examples of 35 projects concerning greening of curriculum at 27 Swedish universities.

CHAPTER THREE

3. Analytical framework

This chapter introduces the analytical framework used for the thesis and the theory used to develop the framework. The chapter does not provide a fully comprehensive theoretical coverage, but is only aimed to touch a theory base for analysing and structuring the findings of the study.

3.1 Public Intervention

Public intervention is a term that is used for actions or measures, which governments use to attain their policy objectives. They do it by using policy instruments, which can be described as “a set of techniques by which governmental authorities wield their power in attempting to ensure support and effect or prevent social change” (Vedung, 1998, p. 21). These instruments are divided into the following types by Vedung (1997):

- *Regulations*, or government directives, demand action from those concerned to work for the policy objectives unless exemption is granted.
- *Economic* instruments provide monetary incentives to promote the attainment of the goal.
- *Informative* instruments are used under assumption that people behave differently when they have better information and understanding.

3.1.1 Studying an intervention

A systematic study of an intervention, for instance an EMS implementation mandated by a government directive, requires a map or model (assumptions) of how the intervention is expected to work (Fitz-Gibbon & Morris, 1996). Such a map is called *intervention theory*, which is the basis for a *theory-based evaluation*. Fitz-Gibbon & Morris (1996, p. 177) define “A theory-based evaluation of a program is one in which the selection of program features to evaluate is determined by an explicit conceptualization of the program in

terms of a theory, a theory which attempts to explain how the program produces the desired effects”. This is “a model, theory, or philosophy about how the program works; a model, theory, or philosophy which indicates the causal relationships supposedly operating in the program” (Fitz-Gibbon & Morris, 1996, p. 178). It describes both the goals of the intervention and the process of achieving the goals, step by step, and is based on both empirical and normative assumptions about it (Vedung, 1997, pp. 301 and 138). Other sources of information that could be used in this ‘reconstruction’ include documents on the intervention, the intuitions and experiences of the designers of the intervention, prior research, logical reasoning and the like (Weiss, 1997, p. 503).

The intervention theory is especially useful in early evaluations of recently introduced policy instruments or interventions, or when the intervention is based on a particular model, whose outcomes have not occurred when the evaluation is performed, or when the outcomes cannot be measured (Kautto & Similä, 2005; Fitz-Gibbon & Morris, 1996). The short range outcomes can, however, be measured using interim markers that are logically tied to ultimate outcomes in a causal chain (Gysen, Bachus & Bruyninckx, 2002). New goals and interim markers for the evaluation that emerge on the way provide opportunities to gain increased insight into the change process (Weiss, 1997).

This theory makes it possible to study changes in a practical way in order to find out whether the intervention is taking place in the way that was envisioned. A systematic comparison of several interventions based on the same concept in other contexts is also possible and it contributes to the advancement of knowledge (Fitz-Gibbon & Morris, 1996).

There is, however, a risk of theory failure, as the theory constructed is not the only possible one. However since the underlying assumptions are visible, it is possible to assess the validity of the theory that is used (Kautto & Similä, 2005; Fitz-Gibbon & Morris, 1996; Weiss, 1997; Weiss, 1996).

3.1.2 Evaluation

The public administration system can be seen to consist of input, conversion and output. Input consists of the resources and motivations behind the intervention. For example, a government can give public agencies *input* to implement its policy. The agencies are then expected to convert or implement it into output (Vedung, 1997). When the output reaches the

addressees (those at whom the intervention is aimed) it results in outcomes, which include all consequences of the output (government intervention) regardless when they take place (Vedung, 1997). There are many different ways to define an intervention. The input and conversion phases of an intervention can also be seen to take place within the government administration and the output then is the first reaching the public agency. This means that the initial outcome takes place within the agency before the final outcome takes place in the society outside.

An evaluation is a “careful retrospective assessment of the merit, worth, and value of administration, output, and outcome of government interventions, which is intended to play a role in practical action situations” (Vedung, 1997, p. 3). Intervention and evaluation are illustrated in Figure 3-1.

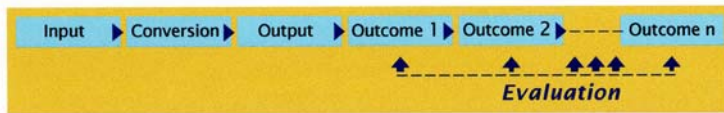


Figure 3-1. A system model for government intervention and its evaluation.

Source: Modified from Vedung (1997, p. 5).

3.1.3 Evaluation criteria

Evaluation requires some criteria against which the “merit, worth and value of things” is determined, and often includes the following (Bemelmans-Vidéc, 1998, pp. 7-8):

- *Effectiveness* – “degree of goal-realization due to the use of certain policy instrument”, that is the costs to reach the goal are disregarded.
- *Efficiency* – “the input-output/outcome ratio of policy instrumentation”, that is the result achieved per unit of cost.
- *Legality* – “degree of correspondence of administrative action in designing and implementing policies with the relevant formal rules as well as with the principles of proper administrative process” including equality and equity (fairness).
- *Democracy* – “the degree to which the administrative actions in designing and implementing policies corresponds with the accepted norms as to government-citizen relationships in a democratic political order”.

- *Legitimacy or political acceptability* – “the degree of actual support a government may realize for its choices, because the actors involved perceive them as in correspondence with their own views, feelings, and objectives.”

The effectiveness criterion has traditionally been the most dominant criterion in evaluation practice and it is also the focus of this study. It concerns whether, and to what extent, the goals of the intervention were attained, but without regarding the costs (Vedung, 1997).

3.1.4 What is evaluation research?

Evaluations have often been divided into two types, formative and summative, depending on their main aims, but evaluation has eventually “grown larger than that” (Patton, 1996, p. 131). The formative approach has the focus on the improvement of the evaluand and is made for those who can make improvements (developers). It has an emphasis on qualitative methods. Summative evaluation, which is “the rest of evaluation”, is made for observers or decision-makers (ibid.). It takes often, but not only, a quantitative approach and aims to determine the effectiveness of the evaluand that is making the overall judgment about whether it should be continued or not (Patton, 2002).

The division of evaluation in these types is not always relevant in practice. For example, evaluations carried out by the US Occupational Health & Safety Administration (OHSA), which are similar to audits of EMS, assess based on a checklist, if a factory passes the safety and health regulations and rules. However, the results are also used to make improvements, making the evaluation both summative and formative (Chen, 1996).

But use of evaluation is not, and does not have to be, limited to immediate use for a decision or action that is expected to happen regarding the evaluand. It can also be used in *evaluation research*, where the findings are used conceptually for generating knowledge and understanding in general (Patton, 1996; Fitz-Gibbons & Morris, 1996; Chen, 1996).

3.1.5 Evaluation of an environmental intervention

Interventions to reduce environmental impacts are quite problematic to evaluate due to their characteristics and our limited knowledge about them (Mickwitz, 2003, p. 432):

- they are complex;
- they have long time frames;
- they often concern geographically remote regions;
- they have very unequal distributions of impacts on different groups in society;
- they have been formulated as problems largely by scientists;
- they often involve huge uncertainties; and
- they involve stakeholders with conflicting objectives and different belief systems.

Two more characteristics have been added to the list by Gysen et al. (2002, p. 10):

- they are irreversible and/or have thresholds; and
- the sources of environmental problems are often diffuse.

The above could be summed up as follows: environmental problems have many scattered sources, they are dispersed in time and place from their origin, and knowledge and ideas about them are also dispersed. But in spite of the problems and uncertainties, governments are using environmental policy instruments. They have been defined as “the set of techniques by which governmental authorities wield their power in attempting to affect society – in terms of values and beliefs, action and organization – in such a way as to improve, or to prevent the deterioration of, the quality of the natural environment” (Mickwitz, 2003, p. 419). But environmental processes tend also to be very slow and complex, which often makes the time between action and ultimate effects of an environmental policy long, making the evaluation of all effects at any point impossible (Mickwitz, 2003).

The types of policy instruments that are used for other interventions can also be used specifically for environmental interventions, but the evaluation of these interventions is complicated by the special characteristics of environmental problems (Gysen et al., 2002; Mickwitz, 2003). The interest and need for evaluating environmental interventions has, however, been increasing, and “fragmented concepts and approaches” have been used by different disciplines (Mickwitz, 2003, p. 415). Mickwitz (2003, p. 416) goes on to suggest that “evaluation concepts that are relevant in other evaluation

areas are also relevant for evaluation of environmental policy instruments, which is a new idea for those working in the environmental field”.

3.1.6 Theory-based evaluation research for studies of EMS

Based on the above discussion, “the sequence of various effects which can ‘reasonably’ be linked together” that was formulated in Papers I and II, can now be expressed in a model in terms of intervention theory without a need of reconstruction based on the amendment of the Higher Education Act (Gysen et al., 2002; Fitz-Gibbon & Morris, 1996). It is based on the staircase model of learning (cognitive – affective – conative) order, which means that knowledge comes first and results in attitude change, which is a precondition for action (Vedung, 1997; Weiss, 1997).

The theory describes the sequence of events and changes that should occur in order for the intended outcomes to take place, and forms an *appreciation of the effectiveness of the intervention* (Vedung 1997; Fitz-Gibbon & Morris, 1996; Gysen et al., 2002). Although intervention theories describing phenomena such as environmental management system implementation or integration of sustainable development in all university activities are likely to vary in details in different universities, they are based on common assumptions about the sequence of steps that are needed to reach the outcome.

The assumed causal chain provides a number of data-collection points, interim markers or proxies for the study. As it is impossible to capture the whole process, these interim markers provide an *“indication”* whether the policy intervention is taking place according to the constructed theory. In other words, even though it is not possible *now* to directly study the ultimate impact, as it is going to take place *in the future*, it is possible to study the steps taken to reach the goal in the assumed sequence of events.

3.2 The model for the study

The elaboration of an analytical framework for the thesis took its first form during the development of Papers I and II. It became apparent that EMS implementation in universities, and the connected steps of change towards a more sustainable society, can be described as a sequence of events following the Government Directives on EMS, that is, in terms of a public intervention. The Swedish Government’s recognition of the need for

sustainable development in society forms the *input* for the intervention, while the *conversion* of the input took place in an inquiry process by a government commission (SOU 1996:112) and resulted in the *output* of the intervention: the Government Directives on EMS implementation to public agencies (Ministry of Environment, 1996, 1997, 1998, 1999, 2001a, 2001b).

The Government Directives were based on the assumption that an environmental management system (EMS) could be used as a tool to support development towards a more environmentally sustainable society. This idea was developed further in the amendment of the Higher Education Act in 2006. This amendment indicated that universities should in all their activities work so that present and future generations are assured a healthy and good environment, economic and social welfare, and justice.

The assumptions of the development process, from environmental management system towards a more sustainable society, are described in the model in Figure 3-2. This model, which has been used to provide structure to the study of the EMS implementation in a university context, can also illustrate the intervention theory and be used to provide structure to the evaluation.

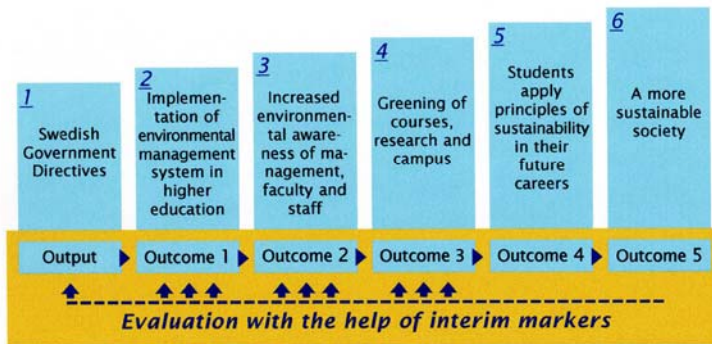


Figure 3-2. Model for the study of SD implementation and integration in university context via EMS.

Source: Combined from Sammalisto & Arvidsson (2005) and Veding (1997, p. 5).

The interim markers function as proxies of the effectiveness of the Government intervention. They indicate whether the intervention of EMS implementation is stimulating change at a university. They are further seen as an indication of the environmental or sustainability effectiveness of the

intervention (Gysen et al., 2002, p. 14). The interim markers used in this study are presented below.

Output: The Government Directives are assumed to be the output of the intervention in universities, which establish the EMS process and without which, the process would, in most cases, not have started. But there can be other driving forces to the process as well. These factors cause universities to start implementing EMS in the next stage and are studied in **Paper I** as the first interim marker:

- a. driving forces including the role of the Government Directives.*

Outcome 1: The implementation of the EMS system is the first outcome within the university organisation. This outcome can be different in different universities, where some do not react in any way, while others introduce elaborate systems and strive for certification of their EMS. The structure of a standardised EMS follows the Plan-Do-Check-Act model and includes the following steps according to ISO 14001: management decision, initial review, policy, planning, implementation and operation, checking and management review. The development of these steps is directly connected to the management decision to implement EMS. Without such a decision, their development is very difficult to motivate. Environmental coordinators then have a key role to play in the implementation process. EMS, according to ISO 14001, also has in its structure repetitive institutionalised evaluations in checking, audits and management review. These are done on an annual basis and are expected to be the drivers for continuous improvement. **Papers I, II** and **V** provide data for the following interim markers:

- b. the position of the environmental coordinator;*
- c. work within the ISO 14001 structure;*
- d. identification of significant environmental aspects;*
- e. work with direct and indirect aspects within the EMS; and*
- f. existence of a policy for or including sustainable development.*

Outcome 2: Management, faculty and staff need to be trained so that they will have the basic knowledge and awareness of why they should work within the EMS, how the system works, and how they, in the functions they occupy, can contribute to the environmental and sustainability goals of the university. Training and communication are integral parts of implementation and operation of an EMS, and without a decision of EMS implementation substantive training of this kind is unlikely to take place.

As university faculty and staff are trained, their awareness of their own role increases and they can take action to make changes in their own work. Without training and communication in connection to EMS, it is difficult to see that this would take place. The management decisions have bearing both on direct and indirect impacts. Everyone is responsible for contributing to the campus management, which results in direct impacts and which constitutes the main impact for non-teaching staff. The main contribution for faculty, dealing primarily with education and research, comes through indirect environmental impacts. The study of the following interim markers is presented in **Paper III**:

- g. participation in environmental training within the EMS;*
- b. perception of faculty and staff of the connection of EMS to own tasks;*
- i. appreciation of faculty and staff of how their own tasks have been affected;*
- j. view of faculty and staff of how they can contribute to sustainable development;*
- k. motivation of faculty and staff to contribute to the environmental activities of the university; and*
- l. perception by faculty and staff of personal responsibility for the environmental activities of the university.*

Outcome 3: As awareness increases, faculty can integrate environmental and sustainable development content in their courses and research projects. However, they may need some tools to start the process. An example of this is the procedure for classification of courses and research projects at the University of Gävle, studied in detail during this research. Without such routines included within an EMS, it is less likely that a high level of penetration of such activities will take place. Both faculty and staff also have a possibility to reduce the negative direct impacts of campus management. The actions of the faculty and staff are assumed to result in increased knowledge, awareness and change in attitude amongst students. **Paper IV** presents the results of a study consisting of the following interim markers:

- m. the level of classification of courses and research applications;*
- n. type of explanation for the classification; and*
- o. experience of lecturers in making the classifications.*

Outcomes 4 and 5: Based on what they learn during their studies, students who graduate from university will make various decisions in both their professional and private spheres that will have bearing on achieving SD. Without an EMS-like process in a university, it is not likely that a structured

integration of SD, based on the requirements of the Swedish Higher Education Act, would take place. However, students will make the most of the significant decisions in their future careers and these will be affected by their whole life experience, and cannot therefore be led back only to for example a particular course while attending university. These outcomes remain to be seen in the future, but are discussed in Chapter 6.

The interim markers studied in each of the appended papers are presented in Figure 3-3 below.

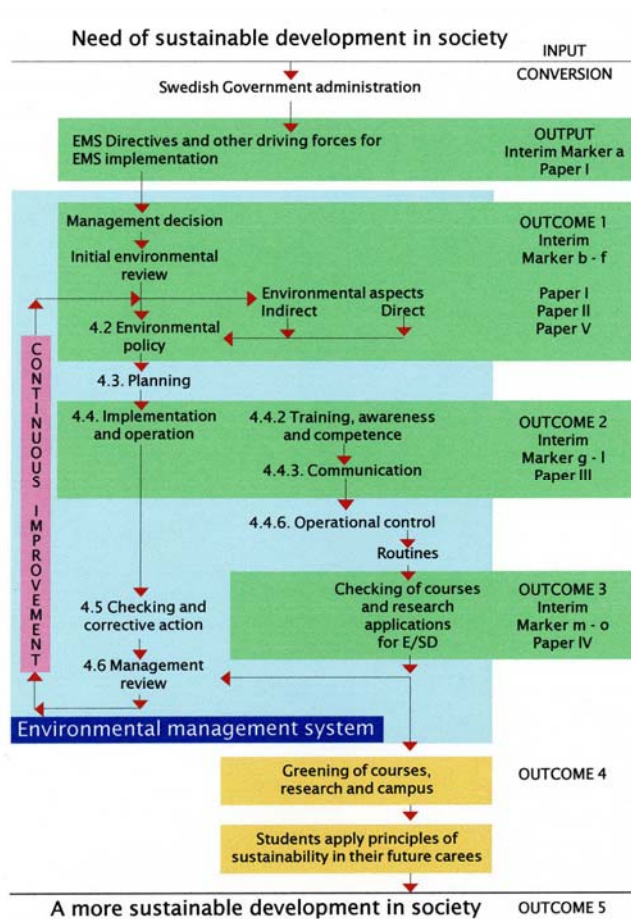


Figure 3-3. Flow chart for the study with interim markers in the EMS structure. The numbers in the figure refer to the corresponding chapters in the ISO 14001 environmental management systems standard.

CHAPTER FOUR

4. Methods

4.1 General considerations for the overall study

The theory-based evaluation was used to formulate a logical sequence of interrelated events to allow assessing the effectiveness of the EMS implementation; although the desired ultimate final outcome, sustainable development in society, still has not yet occurred. The variables for the study of a theory-based evaluation are those which are assumed to be crucial in order to reach the desired outcome of the intervention (Fitz-Gibbon & Morris, 1996, p. 180), in this case the chosen steps in EMS implementation to achieve sustainable development. The assumed linkages of the variables connecting the government intervention, the output, and outcomes were presented in Chapter 3. The effectiveness that is assessed here refers to the degree of correspondence between the intended policy goals and the achieved outcomes (Kautto & Similä, 2005, pp. 64-65). The approach makes it possible to consider even small observable steps pointing in the direction of sustainable development.

As this study focuses on *why* and *how* organisations work with EMS, *how* the EMS was implemented, and *what* the results have been so far, as well as discusses the *role* of EMS in sustainable development; the case study method was found suitable (Schramm in Yin, 1994, p. 12). Both qualitative and quantitative methods were used to allow the research to retain the holistic and meaningful characteristics of real-life events. The “explanatory” case studies were also complemented by “exploratory” and “descriptive” case studies (Yin, 2003), as discussed below. There are further elements of a comparative case study, since some comparisons are made between SMEs, universities and more generally, industrial companies (Schramm in Yin, 1994, p. 14).

According to Yin (1994), social science research can focus on experiments, surveys, histories, and the analysis of archival information. Each strategy has its peculiar advantages and disadvantages depending upon three conditions:

(A) type of research question, (B) the control an investigator has over the actual behavioural events and (C) the focus on contemporary as opposed to historical phenomena. Table 4.1 below presents the relevant situations for different research strategies.

Table 4-1. *Relevant situations for different research strategies*

Strategy	Form of research question	Requires control of behavioural events?	Focuses on contemporary events?
Experiment	How, why	Yes	Yes
Survey	Who, what, where, how many, how much	No	Yes
Archival analysis	Who, what, where, how many, how much	No	Yes/no
History	How, why	No	No
Case study	How, why	No	Yes

Source: Yin (1994, p. 6)

In this research various methodologies, including methodological triangulation, were used in order to study the EMS process and its outcomes in a real-life university context, as described by Patton (2002). These methods include analysis of archival information, surveys, histories and case studies. The methods employed will be outlined in Sections 4.2 and 4.3, starting with the research for the Licentiate thesis (Section 4.2) and followed by the subsequent work concerning EMS implementation in higher education (Section 4.3). The latter section is outlined according to the research questions as presented in Chapter 2.

4.2 Methods used in the Licentiate research

The aim of the licentiate thesis was to study approaches to quality management system implementation, and to identify an approach, or approaches, that could lead to the development of a system of total quality environmental management within a company. The empirical research started when two companies became available in the Province of Gävleborg for a pre-study, already in late 1996. The pre-study was performed to sharpen the focus for the research questions for the main study, and to learn

more about the interview techniques and the company processes in two different types of industries (Yin, 2003).

To increase the reliability of the interviews, in line with the recommendations of Silverman (1993), the interview schedule, as well as the lists of the prospective interviewees, were already in the planning stage at that time given to a scholar and an industry representative for comments, after which some changes were made. Based on the learning done during the interviews in a pre-study, the interview schedule was formed and adjusted only in a minor way after the first interviews in order to better correspond to the interview situation. Tape recording and transcribing all interviews that was undertaken in the first stages, however was not deemed necessary following the pre-study.

The interviews, lasting between 30-90 minutes, were recorded simultaneously, using a personal computer and the notes edited immediately following the interviews. In addition, during the first set of interviews an assistant made notes regarding the interview answers on paper. Subsequently, the notes were compared with the computer transcript, which was complemented when necessary. This was later abandoned, since typing proved to be fast enough to record the answers with sufficient accuracy. All interviews were then printed in order to have a hard copy of the materials. Omission of non-verbal messages, which cannot well be caught by tape-recording and normal notes, was not judged to be of great importance, due to the focus on facts and experiences expressed by the interviewees.

The interview records were coded and combined into “pictures” of the company’s situation as seen by the various actors at different levels of the organisation. These pictures, communicated by different individuals, were subsequently used to create a picture or a collection of pictures of the company as a whole. This resulted in some additional questions, which were discussed in the follow-up interviews with some key individuals in the studied companies.

During the pre-study, twelve interviews were made in the two companies in total. The main study consisted of 38 interviews in four companies. Amongst the companies was included a company belonging to an international corporation and also a small family-run company. The choice of companies was based on availability rather than other criteria. However, in the experiences of the researcher, nothing (during the later stages of the study) indicates that the results are *only* relevant to these companies.

These companies had not yet implemented any EMS. Consequently, the questions were focused on the experiences they had regarding the implementation of quality management systems and the possibilities to connect a management system for health and safety to it. In addition to this, the possible working process as to the implementation of an EMS in an SME (in connection to these systems) was studied, as well as, the common values and relation between *quality* and *environment*. A further goal was to understand the connections between these systems, and to obtain results that could be of practical usage.

Some possible sources of bias in the interviews could potentially come from the following:

- Those responsible for the QMS implementation were bound to be proud of the work they had done and could primarily highlight the positive aspects of its functioning. This however, could be balanced by other employees who were not as directly involved, and perhaps remained more critical.
- The trade union representatives could, by tradition, be expected to be more critical to company management than other employees. The cases where this was apparent were either confirmed or contradicted by the others in the company.
- Since it was known that the study concerned environmental issues, EMS and its possible implementation, people could be expected to make more positive statements as to their interest and engagement in such issues to impress the interviewers. In ABB Nordkomponent, in which environmental issues were already emphasized, the staffs' real knowledge of such issues was confirmed by the way they spoke. In other companies, poor knowledge was demonstrated by the interviewees, as well as their willingness (or hesitation) to do something to change the situation. How much of this willingness was 'lip service' is impossible to say.
- Some could see the opportunity to be heard and to convey a message that they may otherwise have difficulty in spreading. When these messages were primarily individual, they proved to be one of several disagreements in a company, and therefore were not isolated cases.

Triangulation was also used to increase the validity of the study in line with Silverman (1993) and Yin (1994). This included multiple case studies and interviews with several people at different levels in each company interviewed. They provided multiple forms of evidence of the same

phenomenon. Those interviewed were asked not to discuss the content of the interviews with their colleagues. This was done in order for everyone interviewed to meet the questions with the same preconditions.

Other relevant data from the case companies were received by studying documents including organisation charts, initial environmental reviews and reports, business information and financial reports, as well as doing observations and having informal discussions during the visits. There was also an opportunity to attend an environmental training for management, an environmental pre-audit and a certification audit in one of the companies, and the presentation of an initial environmental review in another company.

The reliability of the study was gained through the audit trail. That is, by ensuring, to the greatest possible extent, that the findings reflect an authentic understanding of people's experiences of the inquiry itself, rather than being the product of bias and prejudice on the part of the researcher. The fact that someone could make another interpretation of the material does not necessarily disqualify the first interpretation, as long as it is based on the same material.

4.3 Methods used to study EMS in universities

4.3.1 Why are universities implementing EMS

Research question 1 concerns the reasons for universities to work with EMS, focussing on the drivers and barriers for such work. A sub-question concerns the role of the Swedish Government Directives for the universities, and whether they have been effective as a driver for the implementation of EMS systems. The questions were approached by studies of documents from the government, annual environmental management reports from the universities, as well as two surveys conducted to the environmental coordinators at the participating Swedish universities. This empirical material was supplemented by informal conversations with environmental coordinators, as well as other interested parties at various universities.

A study of the text of all the Government EMS Directives (Ministry of Environment, 1996, 1997, 1998, 1999, 2001a, 2001b) and guidelines for the annual environmental management reports (Ministry of Environment, 1997,

1998, 1999, 2000, 2001c, 2001d, 2002)⁶ was conducted in order to find answers to this research question. In particular, data were gathered and systematised concerning the driving forces and barriers for the implementation of EMS, as reported in the annual environmental management reports from 1999 and 2000. In these years universities were requested to report to the ministry on these issues specifically. Ten out of 13 universities in 1999, and 18 out of 24 universities in 2000 reported on the driving forces and barriers for their EMS work.

In addition, a survey was conducted in March 2003 with 17 university-based environmental coordinators regarding the possible changes in the driving forces and barriers that they had experienced since 1999 and 2000. All 17 environmental coordinators were approached during a conference organised by the Swedish Environmental Protection Agency. All coordinators participated and returned the questionnaire. However, one of the respondents represented a campus, which is only part of a university. Another filled out the form, but in an incomplete manner. These two questionnaires were excluded, leaving 15 complete forms of data for the study. Since the answers concerning the strength of the drivers and barriers were few and in some of the answers the drivers and barriers were placed in order of importance, this question was omitted from the study. The survey questions are presented in Appendix A.

The 17 environmental coordinators represented both Sweden's larger, as well as the smaller universities. Similarly, the universities represented those that offer broad studies, as well as universities with a higher degree of specialisation. Based on the author's knowledge of the situation of environmental work undertaken at the Swedish universities, the 15 universities represented in the questionnaires returned are likely to be a typical sample of the Swedish universities at that time. Included are both universities with a well-known and active environmental emphasis in their work, as well as universities, in which the level of activity is known to be quite limited. The universities that are not represented are judged to be of largely of a similar mix, regarding concerns related to their EMS work.

⁶ The first EMS Directives included also guidelines for reporting. Starting 2001 separate guidelines for reporting have been issued. A general guide for the work with the EMS work in public agencies was published (Ministry of Environment, 2003). The annual environmental reports for the universities were sent to the Ministry of Education in connection to, but not included in, the annual reports of the universities. Copies can be obtained from the Ministry.

Table 4-2. Annual reports reviewed and survey respondents (2003 and 2006)

University	Directive	Submitted annual report					Survey	
		1999	2000	2001	2002	2003	2003	2006
Lund University	1997		1	1	1	1	1	1
Stockholm University*	1997		1	1	1	1		1
Göteborg University	1998	1	1	1	1	1	1	1
Umeå University	1998	1	1	1	1	1	1	1
Linköping University*	1998		1		1	1	1	1
Royal Institute of Technology	1998	1	1	1	1	1		
Mid Sweden University*	1998		1		1	1	1	
Mälardalen University	1998	1	1	1	1	1		1
University of Gävle	1998	1	1	1	1	1	1	1
Uppsala University	1999	1	1	1	1	1	1	1
Karolinska Institutet	1999	1	1	1	1	1		
Karlstad University	1999	1	1	1	1	1	1	1
Växjö University	1999	1	1	1	1	1		
Örebro University	1999	1	1	1	1	1		1
Kalmar University	1999	1	1	1	1	1		
University of Borås	1999	1	1	1	1	1	1	
Halmstad University	1999		1	1	1	1		
Kristianstad University	1999	1	1	1	1	1		
University of Skövde	1999		1	1		1	1	1
Malmö University	2000		1	1	1	1		
Gotland University	2000		1	1	1	1	1	1
University West in Sweden	2000		1	1	1	1		
Stockholm Institute of Education	2000		1	1	1	1		
Södertörn University	2000		1	1	1			1
Luleå University of Technology	2001				1	1	1	1
Blekinge Institute of Technology	2001			1	1	1		
Dalarna University	2001			1	1	1		
Stockholm University of Physical Ed. & Sports	2001			1	1	1	1	
University College of Dance	2001							
University College of Film, Radio, TV & Theatre	2001							1
University of Arts, Crafts and Design	2001			1	1	1		
Royal University of Fine Arts	2001				1	1		
Royal University of Music in Stockholm	2001			1	1	1	1	
University of Opera	2001			1	1	1	1	
University of Acting in Stockholm	2001			1	1	1		
		13	24	29	32	32	15	15
Chalmers	private		1					1
Jönköping University	private							1

Note: The universities are listed with their present names. Three universities (marked with *) submitted their environmental management reports for year 2000 a year late in 2002.

The data was then compiled in a database, coded manually and analysed to provide a more comprehensive picture. Coding was done individually by two researchers and could be agreed upon without significant discrepancies. Comparing data from the annual reports for 1999-2000 and 2003 from the universities, along with the survey from the 17 university-based environmental coordinators provided a longitudinal study of the driving forces and barriers.

The longitudinal study was completed from a survey conducted for the environmental coordinators/managers of 38 Swedish universities (35 public and 3 private) in October 2006. A reminder, to improve follow-up, was sent a week later. This survey followed the amendment of the Swedish Higher Education Act in February 2006, to include sustainable development in the work of institutions of higher education. A set of specific questions in this survey focussed on the drivers and barriers for education and research for sustainable development. After questions regarding existing or lacking support, open questions were also conducted as to what the Ministry of Education and also the specific university could do to support the aim to achieve with sustainable development within higher education. The survey questions are attached in Appendix B.

Replies were received from 17 of the universities (45%). These universities represented a similar mix of universities, as in the survey in 2003. The contacts with the two private universities included in the survey, indicate that their way to work with EMS and ESD does not deviate from the public universities, even though they were not included in the Government Directives. Some of the smaller universities did not have an environmental coordinator at the time, a fact which may explain the lower rate of response.

The answers were compiled in a database. Yes/No replies were analysed quantitatively to provide statistical representations. The qualitative open answers were analysed to provide a richer picture as to the situation at the corresponding universities. In the final analysis, the results of the previous studies and information from colleagues within the same study field were also utilized to provide an additional contribution to the discussion.

The main focus regarding the work of the environmental coordinators and managers has, so far, been the environmental dimension of sustainable development. Less effort was spent on the social, cultural and economic dimensions of sustainability. However, it was known at the time that many of them could also be expected increase their work related to the wider

concept of sustainable development. They were assumed to have the best insight regarding the work with EMS and its connection to education for sustainable development (ESD) based on their large networks at their universities. Consequently, they were chosen as respondents for the survey.

The answers to the October 2006 survey came predominantly from those environmental coordinators/managers, known to the author to be amongst the most engaged in environmental work at Swedish universities. However, they do not always represent the universities with the most active work. Instead, the author's evaluation, based on knowledge of the work at various Swedish universities, rather implies that the answers came from universities largely typical for their group as outlined above (larger and smaller universities, state/private and universities of creative arts).

The results of the first studies, up to 2003, concern the question of *why* universities work with EMS. The results are found, in more detail, in Papers I and II, attached to this thesis. Paper V, also attached, includes the results from the study conducted in 2006.

4.3.2 How are universities working with EMS

The second research question asks how universities work with EMS. The question implies issues such as: What do they focus in their work? What environmental aspects, as defined in Ministry of Environment (2000a), have the universities identified, that is, what do they perceive to be their environmental impacts, and what aspects have they prioritised, that is, what do they see as the most significant environmental impact to address? The second research question also includes a sub-question whether the implementation of environmental management systems have resulted in any improvements in direct environmental impacts to date.

The analysis of the annual environmental management reports, as well as the two surveys in 2003 and 2006, which were presented in the previous section, also provided a substantial input to this research question. These studies were also supplemented by a case study undertaken at the University of Gävle, concerning the training and communication activities within the framework of implementing a certified EMS.

The universities, amongst other public agencies, were asked to answer the following questions in the reporting guidelines (Ministry of Environment, 2003):

- Whether, and when, was an environmental review performed? Whether, and when, has such a review been reviewed?
- What are the significant environmental aspects?
- Is there an environmental policy? Whether, and when, it has been reviewed?
- What are the environmental objectives and targets?
- Have the targets been reached and through what activities?
- Are the targets integrated in the operational plan?
- Has the management, or other groups of faculty and staff, been provided with any environmental training during the year and how many attended? What was the focus on the staff training?
- Whether, and when, were internal and external audits performed?
- How much, and what type of environmental integration is there in procurement and purchasing?
- Is the authority certified or registered according to ISO 14001/EMAS?
- Does the authority aim at certification or registration?
- Are there any positive changes noted due to the EMS during the year?

The environmental aspects were analysed from the annual environmental management reports from the Swedish public universities in 2002 and 2003, the progress of the EMS implementation in the annual environmental management reports in 2001, 2002 and 2003, and various web-pages from the participating universities were searched and analyzed for additional information regarding the environmental coordinators' position. Other sources contributing to the discussion are the Swedish Government Directives and Official Reports (SOU), the databases available at the university library of Gävle, and relevant literature.

The position of the environmental coordinator was studied, in order to understand the organisation and the focus of the EMS work. This position was seen as an indication of how prioritised the work with EMS is at a university. A position in the president's (vice chancellor's) office would indicate a higher priority than otherwise.

Prioritisation of environmental aspects, as well as the work with objectives, targets and audits indicates how the university is following the structured EMS cycle according to ISO 14001. All the environmental aspects were listed. The terminology used in describing environmental aspects from the different universities was somewhat more coherent than the one describing drivers and barriers, but some of the answers had to be clustered into groups (coded). For example, chemicals and hazardous waste include also laboratory activity, and energy use includes electricity, heating and cooling of the buildings.

The environmental objectives and targets are defined in order to reduce the university's main environmental impact, corresponding to significant environmental aspects. They help to focus the efforts and make it possible to follow-up on how the work is going. The results from the universities with only one type of environmental goals, without separate objectives and targets, were analysed along with targets, since they appear to be followed up in the same way. The results from the university with only activities that are followed-up were also included in this group. The reporting was presented in a table with both the degree to which the target has been reached (to 100%, more than 50%, to 50%, less than 50% and not at all) and how the results were evaluated (by indicator, survey, estimate or other).

As a requested way to reduce the environmental impact, the government asked the authorities to make environmental requirements in their procurement (Ministry of Environment, 2001). The annual reports for 2003 provide some information about this, although there was some discrepancy in the formulation of the questions concerning procurement and purchasing. This resulted in two different sets of instructions about the reporting. One asked for the percentage of purchases based on framework agreements from other public authorities or the number of framework agreements that the authority had applied. The other asked for the percentage of their own purchases through framework agreements where environmental requirements were made. This resulted in data either in percentages or numbers, which makes creating a 'true' total picture impossible. Information was also requested about the types of environmental requirements, and some examples of environmental requirements in procurement were included. The answers to these also vary to a great extent; therefore only examples of environmental requirements, in which 24 of the 32 universities supplied, are summarised in Paper II. The data were compiled in a database, coded manually and analysed in order to provide a more comprehensive

picture. No previous study of the procurement and environmental targets was available earlier regarding the universities.

Papers I and II, attached in the thesis, contain results from these studies. Paper II continues under the assumption that EMS implementation could take different forms in the various universities under examination. A comparison was made to the situation studied in Paper I in order to analyse the development of the environmental aspects and the progress of EMS implementation. Environmental requirements on procurement were also studied as well as the measurement and achievement of environmental targets.

The amendment to the Swedish Higher Education Act in February 2006 to include sustainable development provided the starting point for Paper V. According to the amendment, the universities should start to promote sustainable development within all their activities. This also includes education and research. The paper reports and discusses the data from the October 2006 survey, with focus on the results of the environmental management work in Swedish universities and the strategies that Swedish universities are using to implement education for sustainable development.

The first questions in the October 2006 survey to all of the 38 universities focussed on the results of the EMS work with direct environmental aspects. These were followed by a question as to whether the indirect environmental aspects were or were not included in the EMS and the reason for the approach chosen. The next questions enquired whether the university has a policy for sustainable development, and if it incorporates education and research. The following questions concerned what tools are used in order to work with indirect aspects. The final question aimed at finding suggestions of regarding how the results and efforts for ESD could be evaluated.

A case study on training and communication

Empirical material regarding the training and communication pertaining to EMS implementation was obtained during a single-case study (cf. Yin, 1994 and 2003). This was an explorative case study in a real-life context (Yin, 2003), based on the implementation of an EMS at the University of Gävle. The University of Gävle was selected in order to gain a comprehensive picture of one university. Furthermore, Gävle is one of the few Swedish universities, which has implemented a comprehensive and certified EMS.

The approach of the study was practical, positivistic and quantitative, however some qualitative elements are present. A significant input to interpreting the results comes from the experiences of the author, and the co-author of the research paper, which followed the implementation of EMS in several industrial companies. It should be noted that at the time of the survey, the EMS was still in the implementation phase. A number of procedures were not yet implemented and all of the persons involved were not yet fully aware of their roles within the EMS.

The study is based on the following activities:

- A literature review concerning effects of training in the implementation of EMS (ISO 14001) in industry and other organisations.
- A description of the training and communication system and practices at the University of Gävle, based on documents and the author's personal experiences.
- A survey in May 2004 among staff concerning perception of training and communication during implementation of EMS at the University of Gävle.

A literature review was made concerning the effects of training during implementation phase of EMS in various organisations. This revealed only one study, undertaken by del Brio & Junquera (2001), which reported on the results of training efforts for a successful certification.

The methods of training at the University of Gävle are described in detail, which provides a practical example for those interested.

A survey questionnaire was distributed to faculty and staff by email. The objective of this survey was to evaluate the perception of environmental training and communication undertaken at Gävle as elements of the implementation of the EMS. The questionnaire focused on the following topics:

- Awareness: in particular, whether the respondent was familiar with the intentions of the environmental policy, objectives and EMS procedures.
- Attitude: in particular, whether the respondent perceived that the EMS had affected the daily work, if he/she had support from managers and supervisors, and if he/she perceived a personal responsibility to contribute to the university's environmental activities.

In total 856 questionnaires were distributed by email. All departments of the university participated in the survey. The questions are available in Appendix C. The questionnaire included 21 pre-coded questions, plus space for individual comments. A week afterwards, a reminder was sent out to the participants following the first email containing the survey. The survey and analysis software programme *Business Intelligence 7.1* (BIBASE 7.1) was used during this process. The questionnaire was anonymous and the results were initially calculated using BIBASE and then in MS Excel. The initial compilation of data was reported in Erenlöf & Flodin (2004).

The research had an explorative characteristic in the sense that no previous empirical data was available regarding the results of the communication and training efforts in connection to EMS in the university context. The question regarding how these efforts were perceived by faculty and staff and what results were observed was also unresearched.

A total of 315 responses were received, corresponding to a response rate of 36.8% based on the 856 email questionnaires which were distributed. The intention was to reach all management, faculty and staff at the university, but it was known that the number of email addresses exceeded the number of people, who were in the employment register at the time (672 fulltime equivalent persons)⁷. The reply rate both for individual departments of the university, as well as, for the total survey is high, considering that many of the faculty come to the university only for their lectures and/or an occasional meeting. There is also an outspoken tendency *not* to reply to various mail (or e-mail) requests for information. Clearly, from this perspective, such a reply response must be considered exceptional.

Because the principal author of the report was active during the implementation of ISO 14001 (for instance, in training the faculty and staff, coordinating environmental committees, and coaching students), some precautions were taken to avoid bias as a result of personal involvement. The fact that the author was known to many persons at the university may have increased the likelihood of replying. However, there is little reason to expect that the answers would be tilted either to a positive or the negative response, as also indicated by the comparative studies made by students at the university (Erenlöf & Flodin, 2004; Abasi et al., 2007). The questionnaire

⁷ The various forms of employment; from full-time to single hours, make it difficult to calculate the exact number of employees at any given time. Using 672 persons in the employment register as a base would give a response rate of 46.9%.

was anonymous, which should have made it easier to express critical views. Questions related to the role of the researcher will be discussed in more detail, in Section 4.4.

Based on the employment statistics from 1 January 2004, the percentage of replies from the different departments followed, quite well, the estimated percentage of the staff in the department(s) in question. This, presuming that the number of short-term faculty and staff is relatively equally divided amongst the departments.

The following functions, as defined by the respondents, were represented in the survey (percentage of total respondents): managers (6%), environmental coordinators (1%), lecturers (49%), administrative staff (35%), laboratory staff (2%), service functions (5%), and others (12%).⁸

The gender distribution of those who replied (51% female, 49% male) corresponds well to the similar statistic of those employed (55% female, 45% male). There was a slight bias which demonstrated that the males answered to a slightly larger extent. All age groups were represented in proportion in accordance with the employment profile, with the exception of the age group 40-49 years. This age group was somewhat under-represented when compared to the university's overall age distribution (30% at the university, compared to 24% in the survey).

The percentages of those, who have participated in the training, varied somewhat amongst departments between those who replied in the survey and those reported by the departments in their environmental reports of April 2004. However, the overall figures for the whole university reflect the survey results in this respect. The figures indicate that in three departments (Business Administration and Economics, Humanities and Social Sciences, and the President's offices) a higher percentage of persons indicated that they had participated in the training in the survey. In the Education and Psychology department, fewer responded than as reported in the statistics regarding the size of this department. This might lead to some bias in the answers resulting, for example, in a somewhat higher awareness of university environmental policy and goals than otherwise anticipated.

⁸ Since a person can represent more than one function at the same time, the total adds up to more than 100%.

The results of the case study at the University of Gävle on training and communication were reported in more detail in Paper III, which is attached to this thesis.

4.3.3 Institutionalisation of sustainable development

The third research question asks whether an environmental management system can be an effective means by which to institutionalise work for sustainable development, and in particular education for sustainable development, in higher education. The assumption underlying this research question is that the integration of sustainability and environmental content in courses and research is necessary, in order for students to be confronted with these issues during their university education, and in order to be able to apply these principles in their future work (Holt, 2003; Sterling, 2004).

The answer to this question was sought during a literature study combined with a case study at the University of Gävle. The case study was seen as valuable since there are few detailed descriptions regarding the methods to achieve sustainability at universities through integration of principles of sustainable development in education and research (Corcoran & Wals, 2004). The case study provides empirical data and describes a method, initially part of an EMS, which could start a process of reflection, discussion and change for sustainability.

The particular research questions in this study were: How have courses and research projects been classified (concerning degree of incorporating sustainable development)? With what dimensions of sustainable development have they been explained? How has faculty undertaken the classification and how did they experience it?

The institutionalisation of classifications and explanations within the EMS of the university is described. The results of the classification procedure for all the 1317 courses offered 2002-2005 (of which 72% were classified and 44% of those explained) were explored by analysing the original classification forms. The original classification forms for the 125 funding applications for research projects for 2005, were analysed in the same manner. Thirteen semi-structured interviews were made with lecturers concerning the procedure. The discussion also explored how the procedure could be used to advance the lecturers' learning and, ultimately, sustainable development.

The data concerning classifications of courses and research projects were compiled in an Excel-database for statistics. They are presented as the percentages of classes A, B, C and D for the content of (the contribution to) environment and/or sustainable development. The classification forms, included in Appendix D, aimed to help the lecturers in the classification. Explanations of the lecturers and researchers were divided into dimensions of sustainability, based on their own words. In case the keywords *ecological*, *economic*, *social* and/or *cultural* were not used explicitly by the lecturer, interpretation was made by the author. The material was coded manually, and independently, by the researcher and a colleague, and, subsequently, discussed to reach an agreement on interpretation regarding the ambiguous texts. The results were analysed to find out the percentage of courses and research projects classified in the four dimensions of sustainable development: *environmental*, *social*, *cultural* and *economic*.

In addition, interviews were conducted to explore the lecturers' experiences of the classification procedure, and possible changes of courses due to the incorporation of the classification system. In addition, it was intriguing to explore how the lecturers define sustainable development, that is, the understanding obtained regarding what sustainable development meant. Thirteen 15-minute semi-structured interviews were conducted with selected lecturers. Initially the interviews were not time-limited. However, it turned out that the questions were generally well-discussed within 15 minutes. The interview questions are provided in Appendix E. The lecturers interviewed were partly chosen based on their availability at the time of the interviews. However, they were also chosen to represent at least two different subjects at each of the five departments considered relevant for a deeper analysis. This allowed for a wide representation of disciplines, even if the number of interviews was limited. The Department of Economics and Business Administration was excluded in the interview process, and all classification, pertaining to these departments, was made by the environmental coordinator alone. Lecturers were also selected so that they had all used the classifications B, C or D. That is, they assessed their courses to contain some content pertaining to the environment or sustainable development (E/SD) (classification B), to have the potential for inclusion (classification C), or not to be relevant for such a classification (classification D). Together they also used all dimensions of sustainability in their assessments. They were, during the interviews, asked questions about their experiences and difficulties in filling out the classification form, how they arrived to the classification, what the results of the classification were, as well as possible

changes to the courses, and how the procedure could be improved. Finally, they were asked about their definition of sustainable development.

As the author had been responsible for the environmental training in some of the different departments, and had introduced the form for discussion in some of the departmental meetings, this was an important issue to deal with when designing the study and when interpreting the results. This will be discussed in further detail in Section 4.4. Those interviewed appeared however to answer frankly and including also negative comments. The results do not, in this respect, deviate from other studies and interviews performed at the university by, for example, Erenlöf et al. (2004) and Abasi et al. (2006).

4.3.4 Industry and universities

The fourth research question addresses the differences between the implementation of environmental management systems in a university setting and in industry. It also discusses what universities and industries can learn from one another. The research presented follows the development of environmental management systems during the 1990s and up to 2006. The initial studies were initiated when the environmental management systems were just created and only implemented in larger international companies. These, in their turn, were placing requirements on the subcontractors, many of them SMEs. In the licentiate thesis, this later process was interesting to study, that is, to deal with EMS implementation in Small- and Medium-Sized Enterprises (SMEs) and to explore whether this process could lead to achieving more sustainable development (Sammalisto, 2001).

As EMS started gaining ground in public agencies and especially in universities it became interesting to study the same question in a new context using the pre-understanding gained both in the licentiate thesis, as well as, from previous working experiences in industry and as lecturer and tutor at a university. Being a lecturer provided insight in EMS implementation in close to 100 organisations while coaching students since 1997, whereas being Dean for environmental management and education 2001-2005 involved all the aspects of leading an EMS implementation, starting from an initial review to internal and third party audits. The new role of the author in the university system provided an access to make in-depth studies in the university context, where detail studies have so far been missing. This has also allowed a number of follow-up studies and discussions in the different departments of the universities, among faculty

and staff representing different disciplinary backgrounds. This has contributed to the research with new questions in an iterative process, similar to the model for ISO 14001 cycles with revisions, new targets etc. (Gummesson, 2000, p. 58; Yin, 2003).

4.4 Methodological challenges revisited

The research for this PhD thesis has included a number of distinct studies, undertaken during a period of more than ten years. These studies have employed a number of methods, including, in particular, literature studies, document analysis, surveys, and interviews. Two case studies were carried out at the University of Gävle, which incorporated document reviews, a survey and interviews. Table 4-2 gives an overview of the main studies performed for this thesis.

A number of the author's studies regarding EMS implementation in higher education have embraced and analyzed all Swedish universities. In particular, the surveys undertaken in 2003 and 2006, as well as the reviews of the Government Directives and environmental management reports attempted to do this. Information from the total population of the universities was also sought via university web-sites and informal contacts with environmental coordinators and/or other interested parties. These studies were connected to various problems related to the interpretation of information and the potential biases of the respondents. This issue will be explored further in Section 4.4.1, below.

Table 4-3. Overview of some main research methods employed

Type	Object of study	# (sent/responses)	Year	Paper
Surveys	Survey	17 / 17 (15 used)	2003	I & II
	Survey	38 / 17	2006	V
	Email survey	845 (672) / 315	2004	III
Interviews	Companies	12+38	1997	Licent.
	University lecturers (Gävle)	13	2006	IV
Document reviews	Government Directives	10	1996-03	I & II
	Environmental management reports	13	1999	I
		24	2000	I
		29	2001	II
		32	2002	I & II
		32	2003	II
	Course classification forms	1317	2001-05	IV
	Research classification forms	125	2005	IV

The studies have been presented above in Sections 4.2 and 4.3, and more details are found in the appended papers.

The fact that EMS has a general requirement for documentation regarding meetings and routines, as well as regular reporting, has made the study of documentation and the follow-up of the process easier. It has also added to the validity of the study. This was valuable in the analysis of material from the various universities, but in particular, during the case studies undertaken at the University of Gävle. The fact that the author has worked for some time at the University of Gävle and was active in the implementation of the EMS at the university has posed special challenges for the design of the research. This is discussed in Sections 4.4.2-4.4.4, below. Section 4.4.2 discusses the selection of the case studies and gives reasons for performing the studies at the University of Gävle. Section 4.4.3 examines an action research approach and discusses whether the case studies can be seen as examples of action research. Finally, Section 4.4.4 discusses the problems related to the position of the author at the University of Gävle and what measures were taken to limit the risk of bias in the collection and analysis of information for this research.

4.4.1 Basing information on environmental coordinators

The picture that has emerged in the studies of Swedish universities reported in Papers I, II and V is the perspective seen from the environmental coordinators at the universities. The environmental coordinators are the ones who could be anticipated to have the most complete overview of the environmental work at their universities. However, the picture could also be biased both when it comes to highlighting positive achievements experienced and downplaying potential problems faced. In practice, they compile, and co-sign the environmental reports, although the president of the university is the official authority responsible for signing the document.

Interestingly, the results from the annual reports can be compared with the surveys made amongst the environmental coordinators. In particular, it should be noted that the views of the environmental coordinators, regarding environmental management systems, do not necessarily reflect the views of top management, or other faculty and staff at these universities. However, environmental coordinators are likely the most informed actors in the majority of the universities concerning issues related to the environment and sustainable development within a university as an organisation. All information found in the research is not dependent on these issues, as only the facts and views expressed in the official documentation were sought. For other information, literature studies and discussions with other actors in universities have contributed to balance the potential biases.

4.4.2 Choice of case studies

A significant input to the study derives from the fact that the main author was involved in the implementation of EMS at the University of Gävle, in which two in-depth case studies were performed. In line with Patton (2002), this university was chosen due to accessibility for research and the amount of data available. More importantly however, this university is one of few Swedish universities which have implemented a certified EMS. Consequently, it supplies a unique opportunity for study and can contribute to a deeper understanding of the potential for implementation of an EMS within the context of a university.

The case-study undertaken at University of Gävle was used in order to assess the role of training and communication within the implementation of ISO 14001 in a university-setting. This university was also used regarding the examination of a method for the evaluation of sustainable development in courses and in applications for research funding. The information from the university consists of the following: the analysis of relevant documents, replies from the management, faculty and staff to an anonymous e-mail questionnaire, semi-structured interviews, and the practical experience of the author. The challenges related to performing these case studies, whilst also being employed at the university, will be discussed in the following two sections. The first section discusses whether the research should be seen as action research.

4.4.3 Action research

The cyclic structure of action research is depicted in Figure 4-1. A brief explanation of action stages is provided below.

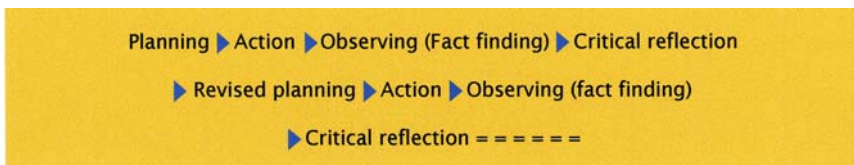


Figure 4-1. The spiral structure of action research

Mirata (2005, p. 16) defines these steps as:

- **Planning:** Includes identification of a problem, or a situation that needs improvement, the formulation of possible actions and the means that can be employed for their execution.

- **Acting:** The agreed upon actions of the planning stage is implemented in the client system.
- **Observing/Fact finding:** Relevant information regarding the action(s) taken and their outcomes is collected.
- **Reflection:** Actions taken and their outcomes are critically evaluated. This is one of the most important stages of the research cycle as this is where most of the analyses are carried out, the learning is made explicit and new actions for improvement are formulated in light of the analysis.

It can be noted that action research has a structure resembling that of the Plan-Do-Check-Act cycle. The goal of the latter is practical improvements, while action research, in addition, aims to understand the situation and the possible approaches for achieving improvements (the research goal).

In action research, the researcher faces the problem of both taking part in the action, and being able to step back in order to reflect on the action and the result of the action, and thus to contribute to the accumulation of new knowledge and/or a relevant theory (Coughlan & Coghlan, 2002).

Mirata (2005) points out that the “analysis of decisions made during the conduct of the study forms the main element that facilitates validity of action research findings”. He also points to other elements, which contribute to the enhancement and the validity of action research projects:

- **Recoverability:** presentation of the work around coherent methodologies and frameworks that have evolved throughout the work;
- The **catalytic effect:** whether the work leads to improvement or change within the context and generates new knowledge;
- **Deliberation:** being deliberately part of action;
- **Impartiality:** findings subjected to public testing.

If action research should be of value, then it has to provide a new understanding about studied practices. It is also crucial to show how this new understanding emerged, in light of the observations made during the research. This means that the process of collecting this increased knowledge must be made explicit by providing a systematic picture of an organised data gathering, which is used as a plan for data collection. To predict what data will be useful is an important and difficult task in action research.

The case studies involving University of Gävle could to some extent be characterised as management action research, where the scientists' role is based on their *paradigms* and *pre-understanding* and given *access to empirical, real-world data*. Through their *role as change agents*, management action scientists develop an *understanding* of the *specific decision, implementation, and change process* in the case with which they are involved (Gummesson, 2000, p. 208). They *generate a specific (local) theory* which is then *tested* and *modified* through *action*. The interaction between the *role of academic researcher* and their *role of management consultant, within a single project* as well as *between projects*, can also help the scientist to generate a *more general theory*, which in turn becomes an instrument for *increased theoretical sensitivity* and an *ability to act* in a social context, a theory that is *never finalised*, but is *continually being transcended* (Gummesson, 2000, p. 208).

Action research is generally used for describing various activities, which have a focus on research, planning, theorising, learning, and development. It refers to a continuous process of research and learning in the researcher's long-term relationship to a problem (Cunningham, 1993, p. 4). This means that action research is interventionist, in opposition to the focus on observation in positivist research. To change what you are studying is a core element of action research. In line with this, action research tries to understand how we can improve the situation or phenomena under study. This study consists of both formative and summative evaluation of the Swedish Government EMS intervention. The fact that the results of a formative evaluation can be used for improvements, and therefore has similar goals as action research, does not make the study pure action research.

Although in this study, action (or change) and research (or understanding) were pursued at the same time according to action research manner, and the study results were communicated continuously at the university and resulted in learning among faculty and staff, the data and the results of analysis were not directly put into practice and used in the later stages of the study (Murata, 2005). Although there are parallels to action research, these studies were done based on the chosen intervention theory approach and its evaluation, using the chosen interim markers as a one-time study rather than an iterative one. They were also performed with an attempt to avoid, as much as possible, the risk of evaluating the researcher's own work and to keep the roles of the researcher separate from other roles.

4.4.4 The background of the researcher

Being a resident at the university has provided free access to the university. This provided opportunities to perform a number of follow-up studies and has fostered numerous contacts with faculty and staff in different departments. This, in turn, has created an understanding of the various disciplinary backgrounds in the faculty that is essential for understanding the academic cultures and the challenge to making sustainability also become an academic matter that could be integrated into various disciplinary contexts.

The study was, for the most part, conducted during real-time events, parallel to the daily work undertaken at the university, although some elements, like the annual reviews and some questions about change as experienced by faculty, form an important ingredient in forming an understanding of the process. These studies were conducted in a systematic approach through the semi-structured interviews and surveys, following the theory of EMS.

Early in the process, the researcher made clear to herself and others that the EMS at the University of Gävle is not her EMS, and that the implementation was an assignment within the work. As soon as the implementation was finished and the system was in place, she resigned from her work as the Dean for Environmental Management and Education at the university. The balance between the two roles varied, placing the focus initially on the practical implementation and moving it more and more towards research. This means “learning to reflect in reflection-in-action, making explicit the theories-in-use that inform it, and learning to design and produce new theories-in-use for reflection and action” (Argyris et al., 1985, p. 78 in Gummesson, 2000, p. 119).

The survey questions, as well as the qualitative and quantitative data analysis, were discussed with academic colleagues. This process has contributed to the reliability and validity of the study, as recommended by Yin (1994). Following Patton (2002), the coding of the material was done by the researcher and a colleague. The two processes to code the data were carried out independently of one another, and the results, contained only minor differences. These were discussed afterwards to agree on a common score. The materials and results of the studies are available for inspection.

The analyses of these two crucial case studies carried out at the University of Gävle were performed together with researchers from outside this university. The data collected and analyzed was then published in peer-reviewed international journals. Further, some of the primary data collection

for some of the interviews was conducted by a researcher from outside the University of Gävle. This does not fully exclude potential biases, however it attempts to make the studies comparable to similar interview-based studies, or studies of documentation and analysis of surveys.

It is, also important to remember that “If evaluations of environmental policy instruments are undertaken without due consideration of the specifics of environmental problems there is a significant risk that little impacts and low effectiveness will be found” (Mickwitz, 2003, p. 433). The specific characteristics of environmental problems in the context of universities, and in society in general, extensively studied by the author, although they are not discussed explicitly in this thesis.

CHAPTER FIVE

5. Results

The results of the study will be presented here based on the interim markers studied for the Output and for Outcomes 1-3. Outcomes 4 and 5 will be discussed in Chapter 6.

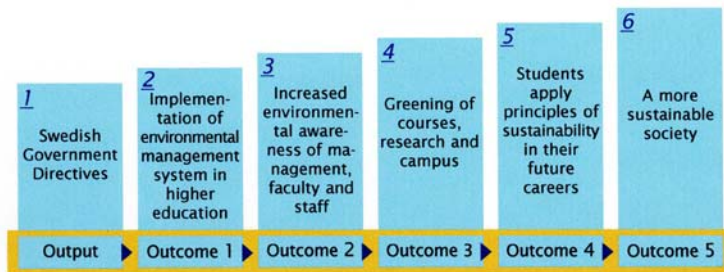


Figure 5-1. Model for study of SD implementation and integration in university context via EMS.

Source: Combined from Sammalisto & Arvidsson (2005) and Veding (1997).

5.1 Government Directive and other driving forces

This section examines the Output of the intervention and the interim marker a, which constitute the driving forces including the role of the Government Directives.

As seen in Figure 5-2, the Swedish universities were, in 1999, mainly driven to environmental management system (EMS) implementation by internal factors; the faculty and staff, the management, and the students. The most important external reasons include the Government Directives and cooperation outside the university. By 2003, the Government Directives

were perceived as the most important external drivers. However, internal factors, such as engagement from faculty and staff, were still considered very important in driving the process (Sammalisto & Arvidsson, 2005, p. 24). The most notable difference, when comparing the drivers in 1999 and 2003, was the reduction in importance of the cooperation with external actors. Student and management engagement were considered much less important drivers, while the external factors; image, marketing and credibility, had increased in importance.

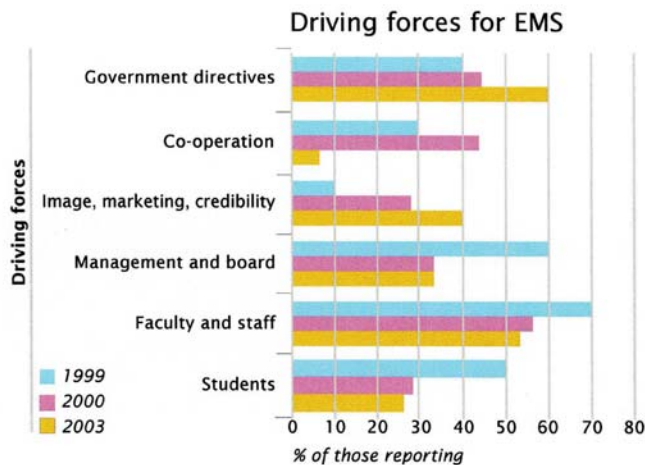


Figure 5-2. Driving forces as reported by universities 1999, 2000 and 2003. Sources: Annual environmental reports for Swedish universities 1999-2000 and a survey with environmental coordinators in March 2003. Driving forces of all categories were not reported every year (Sammalisto & Arvidsson, 2005, p. 24).

The Swedish Environmental Protection Agency annually publishes a summary based on the reporting of environmental management systems from all public agencies. The name of the public agency is marked in different ways, depending on if the annual report was submitted in time, late, or not at all during the last one to three years (Swedish EPA, 2006). This is the main consequence of not reporting. Interestingly, only four out of the nearly 50 agencies under the Ministry of Education received any feedback on their environmental management reports from the Ministry.

The more recent studies, such as the case study of the University of Gävle reported in Sammalisto & Brorson (2006), reveal that while there were often

personal interests (91%) to participate in the university's environmental activities, lack of time was the most frequently reported barrier interfering with personal ambitions. There was, however, sufficient information (73%), support (79%), and knowledge (78%) to participate. The high interest in environmental issues was found, in later interviews, to often be based on previous work experiences and media reporting (Sammalisto & Lindhqvist, 2007). Those who had previous experience working with management systems, or similar routines in for instance health care, understood the possibilities of implementing an environmental management system.

The study conducted in 2006, about driving forces, demonstrates that 71% of the universities incorporate education and research within their EMS structure (Sammalisto, 2007a). Many of them state that they do this since they see education and research as their core business activities through which they can make a major positive contribution to SD in the long run. The rest of the universities (29%) do not have support from the management, or resources, to include education in their EMS. Some also see a risk that within an EMS the focus of education for sustainable development will be limited to the environmental dimension of sustainability (Sammalisto, 2007a). The main barrier for integrating sustainability in education and research appears to be the management structure, which is often quite rudimentary and not developed in the Swedish universities. This means that there is a risk of the EMS having to develop separately from the other structures of the university, if special efforts are not made to align the management systems. The academic nature of universities seems to provide barriers for adopting the structured way of working, which is a characteristic of the EMS.

Support from colleagues continues to be important for the success of the environmental and sustainability work. Whereas the lack of support from those in higher management position – the president, heads of departments and deans – is the main barrier, according to 59% of those who replied.

As discussed in detail in Chapter 4, the studies regarding the drivers and barriers in 1999 and 2000 were based on all of the Swedish universities which had submitted environmental management reports in those years. The survey studies undertaken in 2003 and 2006, however, covered about half of the total number of Swedish universities (17 and 15 of 38). According to the knowledge and experience of the author, the responding universities in the survey studies do not differ considerably in their efforts related to environmental management from the other universities, which did

not participate in the study. The respondents represent the large universities, as well as, the smaller ones. They represent the universities with a broad profile (wide variety of academic disciplines), and, the ones with more targeted or narrow specialisation fields. As the community of environmental coordinators and managers in Sweden is fairly limited, it is possible for a person, active in this field for a number of years, to create an overall picture of the various universities and the situation concerning the implementation of environmental management systems.

It is more difficult to analyze, whether the persons responsible for the environmental management reports (1999 and 2000) and the respondents to the surveys (2003 and 2006) are able to fully judge the real drivers and barriers for the implementation of environmental management systems. In all cases, it is clear that such a question will reflect the subjective evaluation of the respondents – the persons filling in the survey forms and, in the case of the environmental management reports, the persons responsible for drafting the reports, with a certain influence from persons in top management who are responsible for signing the reports. However, it does not seem likely that the issue would be seen as a sensitive question when addressed in the environmental management reports or in the surveys. Consequently, there is little reason to suspect a specific bias as to the answers. The fact that several of the drivers however changed magnitude between 1999 and 2000, in less than one year, must be interpreted as an illustration of the difficulty to precisely determine what the leading drivers and barriers are for such a complex process (in this case the implementation of EMS in universities).

5.2 EMS implementation

This section examines Outcome 1 and the Interim markers: b – the position of the environmental coordinator; c – work within the ISO 14001 structure; d – identification of significant environmental aspects; e – work with direct and indirect aspects within the EMS; and f – existence of a policy for, or including, sustainable development.

The concerns expressed above, for the possibilities to interpret the information given in the environmental management reports and the surveys, will also, to a certain degree, be valid when examining Outcome 1, as the same information sources are also necessary to study these interim markers. However, in this case the information sought is much more of a

factual nature. Consequently, it was also possible to compare with information supplied in other reports and informational materials, such as university web-sites.

A remaining concern is the risk pertaining to the different interpretations of terminology, which, for instance, can be seen in the way environmental training for staff has been put forward as an indirect environmental aspect by some respondents in the 2003 survey. This problem is, however, deemed by the author as not influencing the main picture to a very high degree.

When it comes to the number and composition of the survey respondents, the same conclusions as above are relevant. There is no significant reason to assume that the universities that answered the surveys will differ significantly from other universities in Sweden who did not participate in the survey.

5.2.1 Environmental coordinators

Environmental coordinators or managers often lead and coordinate the work within the implementation of an EMS. Therefore it is interesting to study the connection between how the environmental work is organised, and where the environmental coordinator is placed within a university's organisation. Two main patterns emerge: the coordinator has a function or presence in the building or service department, or works in an administrative position in the president's office. Having the goal of EMS certification increases the likelihood of the environmental coordinator being located in the president's office (Sammalisto & Arvidsson, 2005). This also provides one possible explanation for whether a university will limit the EMS work to *greening* the campus, which primarily works in relation to the direct environmental effects. Or, on the other hand, whether the environmental coordinator will take a more strategic approach and also focus on the integration of sustainability within the curricula and research.

5.2.2 Working within the ISO 14001 structure

Making a hierarchy of priorities, by identifying significant environmental aspects, (based on an initial environmental review) is a key task when implementing an EMS, since it enables an organisation to focus on its most significant environmental impacts. It illustrates how the organisation is able to take advantage of the EMS cycle, that is, the structured approach devised by the system. The environmental policy should, according to the ISO

14001 standard, be specific for an organisation, be based on its significant environmental aspects, and show the overall intentions of the organisation. Here some universities deviated from a structured EMS approach, for example by creating a policy, objectives and targets without first making an environmental review and without prioritising their environmental aspects accordingly (Sammalisto, 2004, p. 8).

Figure 5-3 illustrates the progress of EMS implementation in the Swedish public universities in 2003. By that year, 97% of the universities had created environmental policies, but 13% of them had done so without first prioritising their environmental aspects. During the period of the study, (1999-2003) only 9% of universities had revised their environmental policy and 16% their choice of relevant environmental aspects (Sammalisto, 2004).

Universities were also slow to begin conducting environmental audits, which are required periodically in an ISO 14001 certified system. The main reason to engage in audits was an aim for certification, in which 10% of universities either had or were aiming at (Sammalisto & Arvidsson, 2005; see Figure 5-4).



Figure 5-3. The EMS progress as reported by 27 Swedish public universities in 2003. Source: Sammalisto (2004).

University	Directive year	Annual report for 2003	Performed review	Significant aspects	Environmental policy	Environmental objectives	Environmental targets	Training faculty and staff	Training management	EMS in Strategic plans	Internal audits	Third party audits	Certified/Aims at certification	Revised aspects/review 2003	Revised policy
Lund University	1997	1													
Stockholm University	1997	1													
Göteborg University	1998	1											2004		
Umeå University	1998	1													
Linköping University	1998	1													
Royal Institute of Technology	1998	1													
Mid Sweden University	1998	1											resting		
Mälardalen University	1998	1											1999		
University of Gävle	1998	1											2004		
Uppsala University	1999	1													
Karolinska Institutet	1999	1													
Karlstad University	1999	1													
Växjö University	1999	1													
Örebro University	1999	1													
Kalmar University	1999	1													
University of Borås	1999	1													
Halmstad University	1999	1													
Kristianstad University	1999	1													
University of Skövde	1999	1													
Malmö University	2000	1													
Gotland University	2000	1													
University West in Sweden	2000	1													
Stockholm Institute of Education	2000	1													
Södertörn University	2000														
Luleå University of Technology	2001	1													
Blekinge Institute of Technology	2001	1													
Dalarna University	2001	1													
Stockholm University of Physical Ed. and Sports	2001	1													
University College of Dance	2001														
University College of Film, Radio, TV and Theatre	2001														
University of Arts, Crafts and Design	2001	1													
Royal University of Fine Arts	2001	1													
The Royal University of Music in Stockholm	2001	1													
University of Opera	2001	1													
University of Acting in Stockholm	2001	1													

Figure 5-4. Progress in EMS implementation in Swedish universities in 2003
 Source: Annual environmental management reports for 2003

In 2006 all universities indicated having an environmental policy. Of this, 47% had a policy for, or including, sustainable development. 77% of all these policies included education and research (Sammalisto, 2007a).

5.2.3 Identifying significant environmental aspects

As described above in Section 5.2.2, identifying significant environmental aspects, out of the organisation's all environmental aspects, is the basis for finding the priorities for activities within an organisation's EMS. The most frequently identified significant environmental aspects for the year 2003 (cf. also Figure 5-5), as well as the results for the direct environmental aspects in 2006, are described below. The results for the indirect aspects are presented in connection to Outcome 3 in Section 5.4.

The work with direct environmental aspects, such as use of energy, travel and transportation, waste and waste management, purchase and procurement, use of paper, chemicals and hazardous waste, which were initially classified as the most significant environmental aspects, appeared at first to be no problem for universities. However, it soon turned out that there were little available data outside of the financial, employment and student statistics, which was required in annual reporting already for a long time. Even legal environmental requirements concerning universities were mainly unknown (Sammalisto, 2004, p. 5).

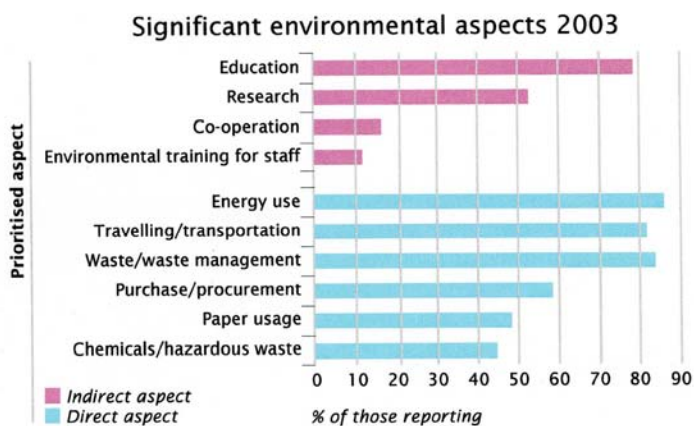


Figure 5-5: Prioritised environmental direct and indirect aspects as classified and reported by 27 universities in 2003.

Source: Sammalisto (2004). The designation of environmental training for staff as indirect environmental aspect was made by a few universities in their reports.

All universities reported working with the direct environmental aspects within their EMS in 2006. As illustrated in Figure 5-6 most universities can

report a reduced use of energy for heating, cooling and electricity, and a reduced use of paper by between 10% and 31% from 2001 to 2006. This was mainly due to double-sided copying and printing. Reduced amounts of unsorted waste, due to improved waste management and increased recycling, are also reported. For instance, the waste handling costs of the University of Gävle were reduced by over 50% from 2005 to 2006 (Högskolan i Gävle, 2007). Improved handling of chemicals, transport arrangements and environmental requirements in procurement are also reported (Sammalisto, 2007a; Swedish EPA, 2006).

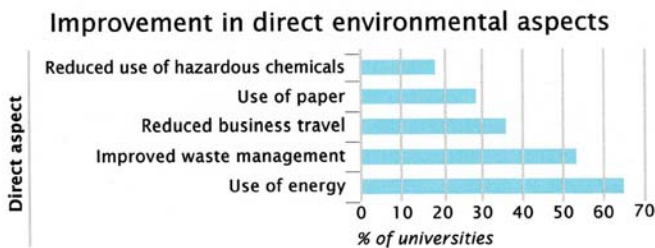


Figure 5-6. Percentage of universities reporting improvements in various direct environmental aspects due to EMS based on replies from 17 (45%) of Swedish universities.

Source: Sammalisto (2007a).

5.3 Increasing awareness among faculty and staff

This section investigates Outcome 2 and the following Interim markers: g – participation in environmental training within the EMS; h – perception of the connection of EMS to own tasks; i – appreciation of faculty and staff of how their own tasks have been affected; j – view of how faculty and staff of how they can contribute to sustainable development; k – motivation of faculty and staff to contribute to the environmental activities of the university; and l – perception of personal responsibility by faculty and staff for the environmental activities of the university.

Apart from policy documents, the most common tools for sustainability education are competence development and training of faculty and students (Sammalisto, 2007a). Increased environmental and sustainability awareness among faculty and staff is also the precondition for the success of a change, such as EMS implementation and, for universities, for education for sustainable development (ESD).

Training of management, faculty and staff was identified as significant environmental aspects from the very beginning by 11% of the universities as shown in Figure 5-5 (Sammalisto, 2004). In 2003, 19% of universities report having an EMS training for the management (Figure 5-3), whereas many universities had started training their faculty and staff already in 1999 (Sammalisto, 2004). By 2004, training, if considering both groups, had reached 53% of the universities (Högskoleverket, 2005, p. 22). How extensively faculty and staff have been involved in training is however more uncertain, since the figure is based on the number of universities that have had some training of management and staff and not on the number of different individuals trained.

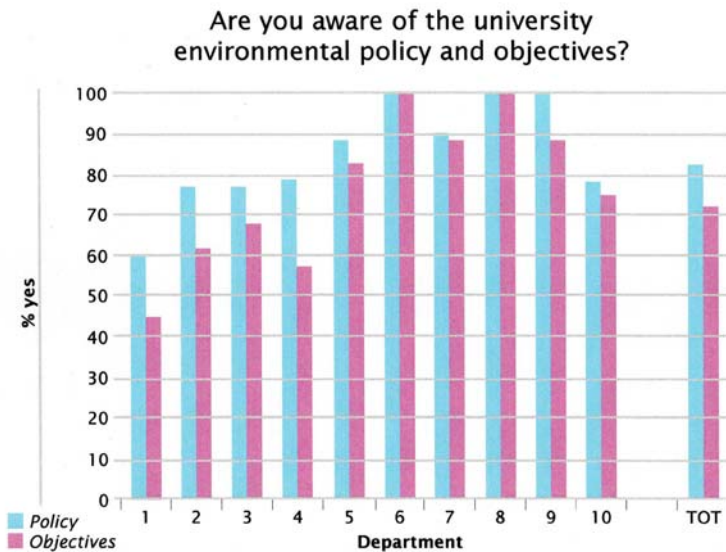


Figure 5-7. Awareness of environmental policy and objectives among faculty and staff at the University of Gävle.

Source: Sammalisto & Brorson (2006). Departments 1-6 deal with education and research and departments 7-10 are administrative. TOT indicates the average for the whole university. The response rate for the various departments were the following: 1 – 34%, 2 – 55%, 3 – 23%, 4 – 45%, 5 – 56%, 6 – 38%, 7 – 62%, 8 – 49%, 9 – 67% and 10 – 82%. The total response rate was 37% (cf. footnote 7). The same response rates apply for Figures 5-8, 5-9 and 5-10.

The case study at the University of Gävle reveals that an average of 73% of faculty and staff reported having participated in environmental training, where the lowest participation was 47% and the highest was 100% when

examining the various departments (Sammalisto & Brorson, 2006). In six out of the 10 departments, the participation was 78% or higher. Most of the faculty and staff reported that they were aware of the university’s environmental policy (83%) and objectives (73%), as indicated by Figure 5-7. This meets the intention of the environmental training to increase awareness of the EMS. In three of the departments all those who replied were aware of the environmental policy and in two of them also of the environmental objectives of the university.

In five of the departments, namely economics, humanities and social sciences, natural and computer sciences, education and student administration, less than 50% of faculty and staff saw a clear connection to their own tasks and stated that the certification process had affected their tasks to a very limited extent, as shown in Figure 5-8.

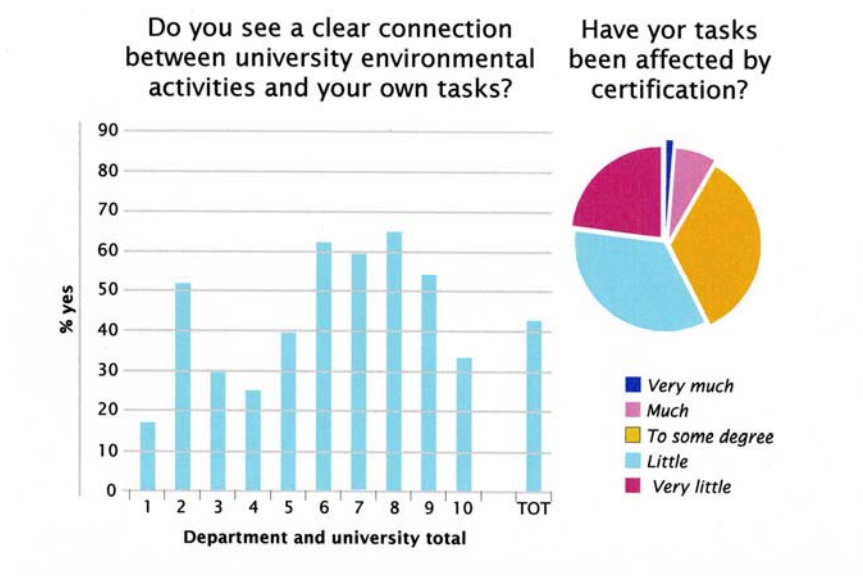


Figure 5-8. The personal connection to the environmental activities and the effect of certification for the faculty and staff at the University of Gävle.

Source: Sammalisto & Brorson (2006).

In spite of the fact that nearly half of faculty and staff did not perceive that the certification process has affected their tasks and saw only limited personal connection, the majority of them felt at least some responsibility

for the environmental work of the university. In six departments, over half of those replying were motivated to contribute to the environmental work, as illustrated in Figure 5-9. The departments where the motivation to contribute was smallest represent economics, humanities and social sciences, natural and computer sciences, education and student administration. That is, the same departments where the connection to their own tasks is seen as the smallest.

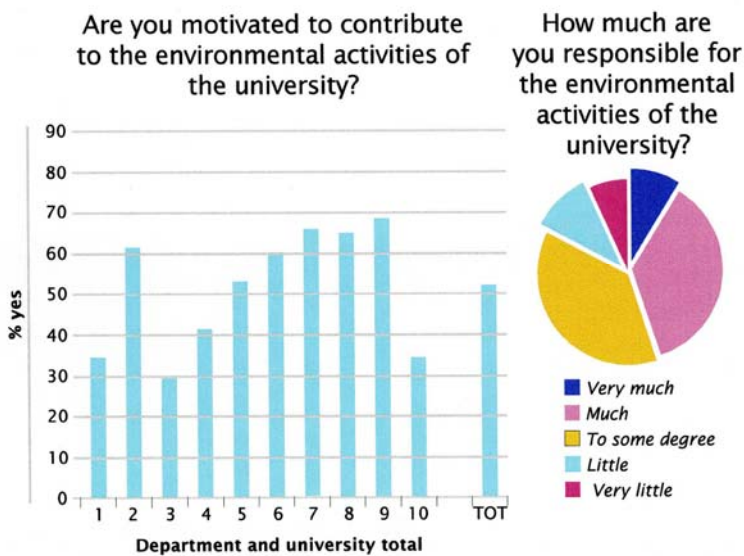


Figure 5-9. Motivation and responsibility for the university environmental work at University of Gävle.

Source: Sammalisto & Brorson (2006).

In all areas of daily work there are those who can see their contribution to sustainable development as depicted in Figure 5-10. The highest contribution is seen in service, education and collaboration, where over half of the replies indicate a possible contribution. Although this question focuses on sustainable development, the results agree with those presented in Figures 5-8 and 5-9 where about half of the replies indicate a connection and motivation to contribute to the environmental activities in the university.

The results presented in this Section rely, to a large extent, on the case study performed at the University of Gävle via an e-mail questionnaire. The

questionnaire was distributed to the all staff emails and the response rate was 37%. As can be seen from the analysis presented in Appendix C, and discussed in Section 4.3.2 and Paper III, the respondents are, to a high degree, representative of the university's statistics. Thus, this representation is consistent when compared to a number of measurable variables such as gender, staff category and department. The validity of the study was enhanced by triangulation along with other information sources at the university, such as records regarding the participation rates in training, information received through informal interviews, and feedback from the persons responsible for environmental work at the different departments.

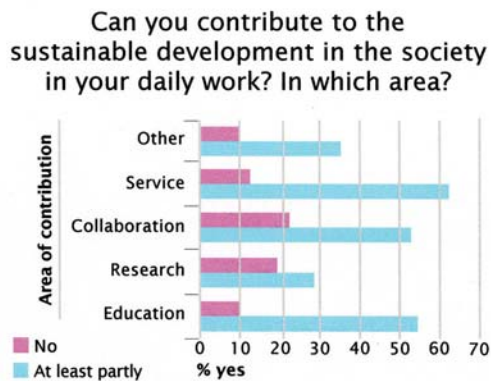


Figure 5-10. Areas of daily work where faculty and staff see they can contribute to sustainable development at the University of Gävle.

Source: Sammalisto & Brorson (2006)

5.4 Integration of environment and sustainable development in courses and research projects

Section 5.4 examines Outcome 3 through the following interim markers: m – the level of classification of courses and research applications; n – type of explanation for the classification; and o – how lecturers have performed and experienced the classifications.

The main tasks of the universities are, according to the Swedish Higher Education Act (SFS 1992:1434, Chapter 1 §2), education, research and cooperation with the surrounding society. These are also the most frequently reported significant indirect environmental aspects for the universities

(Figure 5-5). Although the indirect aspects cannot be measured directly, activities to promote continuous improvement in the methods that are used to stimulate student learning, can be assessed (Sammalisto, 2004). These include, for instance, providing environmental courses for all students and increasing integration of SD in disciplinary courses.

The most common tools affecting these indirect aspects are policy documents, competence development and training of faculty and students. Three universities have also been identified to use classification of courses as a tool. One of these universities also uses classification with explanations for research projects (Sammalisto, 2007a).

The results of the case study of 1317 courses at the University of Gävle indicate that the four dimensions of SD; environmental, social, cultural and economic, were all visible in the explanations of classifications made by the lecturers. Although the courses are frequently classified as addressing one dimension of SD, many of the courses have also been connected to other dimensions of sustainability in the explanations (Sammalisto & Lindhqvist, 2007). The single environmental dimension dominates for courses at the departments representing mathematics and computer sciences, and technology, but is present in all departments.

The social dimension alone, or together with the one or two other dimensions, is dominating at the departments hosting health sciences and education. This dimension is present in less than ten percent of the courses in the department representing humanities and social sciences and only marginally in the department including natural and computer sciences. The single cultural dimension is clearly dominating in the department representing humanities and social sciences, but appears as marginal in the departments representing technology, and natural and computer sciences.

Integration was not considered relevant in theoretical courses in four of the five departments. In all departments you also find optional courses, where students can choose to write about sustainability issues in their papers. Many of these courses contain the economic dimension of SD. It should, however, be noted that the department representing economics is not represented in the study, due to lack of explanations in the classification forms.

The departments representing education and health sciences have a larger number of courses with broad approaches, covering several of the dimensions of SD. They also have, together with the department

representing humanities and social sciences, courses which are classified as including the four dimensions of sustainable development.

The study of 125 applications for research funding in the year 2005 depicted that 90% of them were classified using the form included in the application document. Of the 125 projects, 71%, were also provided with an explanation regarding the project's contribution to sustainable development. Most of the latter research applications include more than one dimension of sustainability. 32% of the applications combine the social dimension with one other dimension, while the corresponding figures for a two-dimensional combination with environmental and cultural aspects are also frequent: 21% and 20% of the research projects (Sammalisto & Lindhqvist, 2007).

Interviews with the faculty within the case study demonstrate that, although a few of those interviewed have experienced the classification mainly as a bureaucratic exercise, many have started thinking about the possibility of integrating SD in their courses. Several discussed the possibilities with their colleagues and moved from thinking mainly about the direct environmental impacts of their courses to the course content and its future impact on the students. One of the interviewed lecturers describes the process in the following way: "It was difficult at first and we did not know what to do. It ended up in direct use of materials etc. Then we started talking with our colleagues and we saw it in a longer perspective. Some of the things can be difficult to interpret or are interpreted too much. But it does not take a lot of time". The lecturers have, for instance, included a new assignment for the students to stimulate their thinking in connection to the course in question (Sammalisto & Lindhqvist, 2007). A lecturer in another department concludes: "It was difficult at first and the first reflection was that it was not relevant. Then we started thinking regarding sustainable development that maybe we have some (content of environment/ sustainable development) and then we saw that it is good. But we (me and my colleagues) thought that it was an administrative invention and it was least painful just to fill in the form and send it further".

The case study described above has two main elements: the analysis of the forms of classification, and the analysis of a set of 13 interviews. The reliability of the first part was enhanced by having two researchers independently interpret the classification made by the lecturers. Following the independent interpretations, the findings were then discussed regarding the different classifications, and afterwards the final outcome was determined. However, there remains a more difficult problem: attempting to

determine whether the lecturers interviewed have a common understanding of the classification forms and the concepts used, in particular in relation to sustainable development.

The purpose of the interviews was partly to better understand how the classification forms were understood and further, how the concept of sustainable development was interpreted. The conducted interviews were also an attempt to enhance the validity of the examination as to the classification forms. Finally, the interviews provided some insight into how the process was perceived by the lecturers and the practicalities connected to filling in the forms. The number of interviews was very limited and should be seen only as a first and explorative study of the procedure and its impact. In order to get a diverse picture, emphasis was spent on selecting interviewees from different departments and representing the various different classification categories in their forms, as described in Section 4.3.3 and Paper IV. In order to address the potential bias related to the author being central in the development of the EMS in the university, the initial interviews were conducted by a researcher from outside the university, who acted as the lead interviewer. Triangulation was also attempted with experiences from literature and through other contacts, formal and informal, and with lecturers at the University of Gävle.

CHAPTER SIX

6. Discussion

It was challenging to study how universities act for sustainable development based on the Government Directives and due to other drivers. It was also interesting to explore what activities the universities have taken within their EMS and to be able to witness some results of them. The findings of the research will be discussed in this chapter, based on both summative and formative evaluation. The effectiveness of the EMS Directives is discussed in terms of a summative evaluation and the formative component comes from the discussion of how the effectiveness of EMS, as a tool for sustainable development, could be improved (Chen, 1996).

6.1 Weak and strong drivers

6.1.1 Weak directive

It would be naïve to expect an immediate action based on the Government EMS Directives, but it was surprising how little compulsory they proved to be in practice. In fact only 60% of the universities considered the Directives to be an important driver for their EMS activities (cf. Figure 5-2). Most universities started the implementation process by appointing an environmental coordinator and adopting an environmental policy, but some universities did not react at all (cf. Figure 5-4). This is evident from the absence of the compulsory annual reporting of their EMS activities. The direct consequence of not reporting was very limited and it was mainly reflected by a different type of text in the summary report from the Swedish EPA; a report which is likely to have only a very limited number of readers. It will be interesting to see, if the ranking list⁹, which has been introduced in

⁹ The ranking list has been introduced to provide the agencies a form of feedback based on the information requested from them. The list ranks the agencies based on the fundamental elements of EMS, with a maximum of 11 points. Out of the 179 agencies with reporting requirement for 2006, 172 (97%) submitted a report. Although universities were not required to leave an EMS report for the year 2006, in anticipation of the simplified reporting (cf. Section 6.1.4), three universities were among the four agencies that had done so. University of Gävle received together with five other agencies

May 2007 with the summary report from the Swedish EPA for the year 2006 (Swedish EPA, 2007), will prove to motivate public agencies to improve their work. The feedback from the Ministry of Education has also been very limited. This means that the Directives, the output of the EMS intervention, have not been very effective. They have functioned as a driver only to a limited degree, and have caused only marginal changes in many universities.

Consequently, we can conclude that other drivers and the absence of barriers, on the flip side, have been more instrumental for the EMS process in most universities. Internal drivers in the form of committed management, faculty and staff, have proven to be especially important.

6.1.2 University management has a key role

There are countless studies of the role of management during a change process in an organisation. These studies have a direct relevance also for universities. The presidents and other top management have a key role in providing a vision for the need to change. They are fundamental in creating an institutional drive and culture of change, as pointed out by Mulder & Jansen (2006). The support and resources need to be available over the long term to signify the importance of the activities. Examples of this are the universities that have voluntarily been working for certification (cf. Figure 5-4).

Clear decisions about responsibilities within EMS, connected to allocation of resources, constitute one of the advantages of EMS in a public organisation according to Emilsson & Hjelm (2004). This requires sensitivity since university organisations are typically built around different academic disciplines and the culture is marked by the particularities of the various disciplines. These are reinforced by the fact that any forces from outside are stamped as ‘meddling with the academic freedom.’ As a result, the EMS implementation needs to be adjusted to suit the academic preconditions. Top management plays a key role in providing opportunities to see EMS and the necessary change for sustainability as an academic challenge, rather than a threat, as was stressed by Mulder & Jansen (2006), Martin et al. (2006) and Wals & Corcoran (2004).

the highest score (11 points), which is seen to reflect progress made in the environmental performance and acknowledges that an EMS is in place (Swedish EPA, 2007).

6.1.3 Importance of feedback and follow-up

The Directives, as well as the Higher Education Act, can be seen as the ‘spark’ to start an intervention and a change, in line with Price (2005). Although the requirement for annual reporting was included in the appropriation directions for universities, the feedback and follow-up from the Ministry of Education is lacking and this has reduced the effectiveness of the Directives as an external driver, as reported in the appended papers. This may also become the case with the amended Higher Education Act.

The nearly total lack of follow-up in universities may be an expression of a tradition of delegation. We can compare the situation to municipalities in Sweden that, according to Emilsson & Hjelm (2004), have little follow-up of earlier measures and, consequently, not much results to show change and limited incentives exist to achieve improvements.

There appears to be a problem in the fact that many academics view all follow-up activities as a form of negative control. This can result in ‘allergy’, as expressed by one of the interviewed lecturers, when asked about the course classification procedure. However the follow-up could also be a way to make improvement potentials visible, and so provide incentives for further activities.

We can conclude that without proper feedback and follow-up from the Ministry of Education, the process of implementation of sustainable development in all university activities must rely on other drivers, like engaged faculty, staff and an occasionally interested top manager or students. The process is not going to be institutionalised, and will therefore remain only as long as the voluntary engagement prevails, without a long term commitment.

The Swedish National Agency for Higher Education could have follow-up of the implementation of sustainable development in universities from its appropriation directions from the Ministry of Education. Such follow-up could be done through questions in the regular self-evaluations, which aim to secure quality and to provide incentives for improvement. The follow-up and feedback from the Ministry is important also in communicating to the university managements that the goals to achieve SD become a priority.

In 2006, eight Swedish universities received an assignment in an appropriation direction to develop a simplified reporting model of the EMS activities in universities (Ministry of Education, 2005). The work has been

going on since then and is expected to result in simplified guidelines, making follow-up easier. It may still leave the question of effective feedback open. Simple questions like: “How are you working for sustainable development at your university?” directed to university managements in the annual follow-up dialogues based on the appropriation directions could promote action. In addition to that, the Ministry may organise formal audits of the implementation of EMS at universities.

6.1.4 The role of environmental coordinators

Environmental coordinators plan and coordinate EMS activities and have, in universities, often a rather ‘lonely’ and difficult task in making the change happen. They are largely responsible for finding ways to adjust the EMS to the academic surroundings. In this work, the support from networks with colleagues, within their own university and from other universities, plays an important role. While some universities have for many years had a clear commitment towards sustainable development, with several staff members working full-time with the EMS and activities related to it; others are just starting with a single person working with such issues, as only a small percent of her/his duties.

The environmental coordinators and managers at the universities have, so far, focussed mainly on the environmental dimension of sustainable development, as their title suggests. The competence related to the systematic way to work, which they have acquired during the EMS implementation, and the broader interests they often show, could motivate to change their title to sustainability coordinators and managers. They have a key role in the overall communication in the organisation being the ‘spider’ in the university web, delivering information both to the representatives of the various departments in an environmental or sustainability council, or task force, and to the management of the university. According to Burström (2002), with the extension from EMS to sustainable development, the environmental coordinators could develop from ‘knowledge banks’ in environmental issues to ‘knowledge brokers’ in sustainability in their universities. The universities could, in a corresponding way, develop further to knowledge banks and brokers for sustainable development in their regions.

The interest and support from the management can be shown, for example, in the fact that the environmental coordinator or manager is located in the president’s office. This is especially important, if the work for ESD is to be

effective. When EMS is limited to work with the direct aspects, a placement in the service or building department becomes rather natural (Sammalisto & Arvidsson, 2005). This may explain some of the differences in the progress in various universities.

Lecturers need, however, to take the ultimate responsibility for the relevant sustainability input in their subjects and courses. If education for sustainable development is separated from EMS, especially if EMS is considered as a non-academic activity, the environmental coordinators can still contribute with their competence. There is, however, a risk of them being left outside the work and the acquired competence can become unexploited or gradually obsolete.

6.2 Improvements in direct aspects

As a consequence of EMS activities, universities have reported improvements in their environmental performance as reduced use of, for instance, paper, energy, transports and hazardous chemicals. Also compliance with legislation, which was somehow expected not to be a problem, is reported to have improved. The initial problem of not having data available for follow-up has also been solved in many cases.

The fact that less-than-half of the universities identified chemicals and hazardous waste as significant environmental aspects in 2003 may have been due to lack of information or, maybe, because they viewed the work of universities as mainly office activities. The reductions in the use of resources can partly be explained by the reduction in the number of enrolled students in some places, but the figures are too high to be explained only by this fact.¹⁰

This indicates that EMS activities have been effective for direct environmental aspects. Although the focus of this study was on effectiveness, which does not include financial considerations, it is obvious that the reduced use of, for example, energy should have the potential to lead to savings. This ought to motivate universities to continue their work, as the improvements are so far likely to only be the first low-hanging fruits.

¹⁰ In the university where the reduction in the use of paper has been 31%, the student enrolment was reduced by 2% between 2001 and 2006. In the university with 10% reduction in use of paper the enrolment actually increased by 14% during the same time (VHS, 2007).

6.3 Indirect aspects in core business

It is interesting to note that in 2003 close to one of four universities did not identify education, and nearly half of them research, as significant environmental aspects. This is remarkable taking into consideration that education and research, together with cooperation with industry and society, are the main three missions, or the core business, of the Swedish universities according to the Higher Education Act.

The challenge to deal with the indirect environmental aspects is that such aspects are not confined to a limited time or space, and that they are very difficult to evaluate in quantitative terms. As indicated by this study, several of the universities initially put their efforts on the direct, or technical, environmental aspects, such as waste reduction and energy management. The same observation can be made from the implementation of EMS in industry, where initially the focus was on smokestacks and waste bins. However, nowadays many industrial companies pay much more attention to the indirect environmental aspects, such as sourcing of raw materials, transport and the environmental performance of the company's products.

In universities, the current focus on the technical aspects of the EMS, as is illustrated in Figure 5-5, may explain why the potential of the EMS is not fully realised by top management. Perhaps they do not grasp the main aim of the EMS, long-term sustainable development, and instead focus on campus management, which provides more short-term tangible results. The typical organisational placement of the environmental coordinators in operational, and not in a higher management position, may support this observation.

Also, the lack of identification of education and research, the core business of universities, as environmental aspects is interesting from another perspective. Although the activities are not fully compatible, it is tempting to compare universities with, for example, electronics producers, if they would leave their production and products, their core business, out of their EMS. In universities, which have been most active with their indirect aspects, the work appears to have been prompted largely by their certification decisions.

6.4 EMS – a structure for institutionalisation

When implementing changes, there is a need for planning such an implementation. ISO 14001 provides in its Plan-Do-Check-Act-structure, in

addition to planning and implementation, follow-up and feedback mechanisms. As discussed earlier, these are important features of a successful change process. Also important is the identification of significant aspects to rank the order of priorities, as well as the objectives and targets to define tangible goals to work towards.

Although there are costs associated with the EMS implementation, there are also cost savings in the short-run from working with the direct aspects. The results from such activities can provide necessary and immediate encouragement. An example of a more long-term cost savings is the emerging discussion in media about slowing or stopping climate change may actually be cheaper than the costs it brings. This is also part of the sustainability discourse.

6.4.1 Training to see the SD connection to own tasks

Increased environmental and sustainability awareness amongst faculty and staff is the precondition for the EMS implementation. It is also important for education for sustainable development (ESD). Training is an integral part of ISO 14001 and it is encouraging that the results are increasing awareness and the perception of one's role in the change, according to our research.

The fact that training and communication, in connection to EMS implementation, dropped on the national level after the first years, as can be explained by the fact that the early initiatives to inform faculty and staff about the EMS work later ceased. How broad the involvement of faculty and staff is in training cannot be seen in the study, since the figure is based on the number of universities that have had training of management and staff, and not on the number of different individuals trained. There is a risk that, if no repetition takes place, the efforts will be forgotten and thus the personnel will not gain new up-to-date knowledge and receive continuous stimulus for the work.

The EMS at the University of Gävle has, in the form of the environmental council, provided a structure for communication and cooperation between departments, as was also reported for Swedish municipalities by Emilsson & Hjelm (2004). Communication channels were opened and the participation of staff in training was exceptional, 73% for the whole university, resulting in a remarkable awareness of the university's environmental policy and its objectives. The training of faculty has not been quite as easy and has resulted

in lively discussions in an academic manner. But, even they have created a certain level of awareness (Sammalisto & Brorson, 2006).

Nearly half (43%) of faculty and staff could see the connection of the university's environmental activities to their own tasks. This corresponds well to the fact that the same proportion of faculty and staff (44%) could see their tasks affected by the implementation and certification of the EMS. However, lecturers at universities are traditionally focussed on their own disciplines. The connection of education and research to the concept of sustainability, as well as to the tangible environmental activities of the university, needs therefore to be clarified. It is apparent that there has been a problem in clearly communicating the purpose and role of the EMS in the long-run. EMS and training are sometimes seen as solely an aim in itself based on a command from management.

Although the motivation expressed by about half of the faculty and staff to contribute to university environmental activities is likely to come also from other sources, such as mass media reporting; the training in connection to EMS implementation provides an opportunity to see their own professional role, as an academic, in the process. It is interesting to note that, in spite of the figures discussed above; a great majority (83%) of the faculty and staff felt that they are responsible for the environmental activities of the university. This may be their way of expressing that they know what they 'should' do as part of their tasks, that is to be responsible, but they have difficulty to see the connection or feel the motivation to do so.

6.4.2 Differences between departments

It was interesting to note the differences between the academic departments representing different disciplines, as well as between the academic and the administrative departments. In the academic departments representing technology and health sciences, it appears to be easier to see the connection to their own tasks than in the other departments. This may be due to connections they have to industry and health care, where working with management systems and routines are more common, and where the environmental and health issues have traditionally been more in focus. In the departments representing economics, humanities, social and educational sciences, and natural sciences, including mathematics and computer sciences, the connection to environment is less obvious. In most administrative departments, being associated mainly to the direct

environmental impacts, it appears to be easier to perceive the connection to the environmental work.

6.4.3 Small steps in integration

Although many universities focused only on the direct environmental aspects in their EMS work, some universities, that considered education significant, have taken tangible action in this direction. The idea of integration has faced the problem of fitting into an overcrowded curriculum and the disciplinary structure. If sustainability is perceived irrelevant by the faculty, it does not make integration easier as reported by, for example, Martin et al. (2006). But there are good initiatives, such as the disciplinary reviews described by Appel et al. (2004) and indications that it can work (Holt, 2003).

Although the results for indirect aspects remain to be seen in the future, the classification of courses and research projects, for environmental and sustainability content, especially with explanations as studied at the University of Gävle, provide an indication of the direction of the development. It was surprising to find out in the case-study that many teachers consider the wider concept of sustainability with the social, cultural and economic dimensions in their courses, especially in the fields of humanities and social sciences. This is interesting considering the fact that the lecturers from these disciplines saw the least connection of EMS to their own tasks, and were the least motivated to contribute to the university's environmental work.

6.4.4 Lack of definition may be an opportunity

The very fact that the concept of SD is not easily defined can provide an opportunity to sustain the work. The new scientific studies of the situation of the life-support system provide opportunities to discuss sustainable development in different disciplinary perspectives, and whether and how the new ideas could be taken into consideration in university courses. This can also prevent the classification activities becoming mechanic, filling in forms without the necessary reflection. There is nothing that indicates that this could not be done in all universities provided the crucial management support is there.

The author considers that, as research is a process that takes longer time and is often planned by researchers within the freedom of research, it is enough at this stage to only classify and explain the degree and area of contribution to sustainable development from the projects. Even though this requirement is likely to face resistance, it can still serve the function of making researchers aware of the need to consider sustainability.

6.4.5 From EMS to ESD

Many of the universities that did consider education as a significant environmental aspect have not taken tangible action in this direction. During the last years at least two universities that considered education and research initially as significant aspects within their EMS have later decided to separate the work with them from their EMS and have delegated the work to special sustainability teams. This can, for example, result in two policies, one for EMS and another for education and research as suggested by Clarke (2006).

As discussed above, the previous work with EMS provides a structure that can, in a natural way, be developed further towards education for sustainability by increasing the focus on the indirect aspects: education and research. The universities with a longer commitment to EMS have often had their EMS certified according to ISO 14001. This has created extra pressure to find ways to work with the indirect aspects and, consequently, pushed such efforts towards a more sustainable system. Certification by a third-party and internal audits appear, therefore, to be important factors in this development. The audits have also provided continuous reminders for the faculty that the work is there to stay and not just one of the many previous policy documents that have no practical consequences to their work. Though the continuous attention may initially be annoying in the autonomous world of academia, the constant reminder may, with time, work for a change in knowledge, attitude and action, which is a fact not to be neglected. A system, such as an EMS, in itself, provides opportunities to use creativity provided it is seen as a tool, a help and not an aim in itself.

6.4.6 How to assess ESD?

As stated earlier, it is not possible to fully evaluate today what happens in the future, when SD, which satisfies basic human needs for all people without damaging the life support system of the planet (Kates, 2000), is to materialise. It is possible to find out with longitudinal surveys how students'

knowledge, awareness and actions toward SD develop during their studies. It may even be possible to find out with interviews, later on, what the students learned about sustainability during their university studies, or what has been the main contributor to their knowledge, awareness and actions towards achieving SD.

6.5 Implementation of ISO 14001 in industry and at a university

6.5.1 EMS in small and medium sized companies

According to ISO 14001 an “environmental management system, EMS, is part of an organization’s management system used to develop and implement its environmental policy and manage its environmental aspects”. A management system is, in the context of the standard, a set of interrelated elements used to establish policy and objectives and to achieve those objectives. A management system includes an organisational structure, planning activities, responsibilities, practices, procedures, processes and resources.

As reported in the literature, and from practical experiences regarding the implementation of ISO 14001 in industrial companies and the public sector, it can be concluded that the existence of a structured and documented management system (e.g. ISO 9000) facilitates the implementation process of an EMS. As emphasized in ISO 14001, the EMS should be a part of the overall management system. Organisations without previous experiences regarding the implementation of a standardised management system, an overall management system, or the use of very informal steering principles, may therefore struggle with the structure and formalities of ISO 14001. As discussed in the licentiate thesis (Sammalisto, 2001), there are several approaches to the implementation of QMS, TQM and EMS in small- and medium-sized companies:

- In companies that show a *reactive approach*, the lack of engagement of management is apparent, and the potential of the management system is not utilised in terms of communication, cooperation or for the development of the organisation.
- In companies that show a *coactive approach*, the potential of the management system is only utilised at a low level. Management signs the

required documents, but the involvement in the implementation process is low, and opportunities for increased information and cooperation are not fully explored.

- In companies using the *process-oriented* approach, the opportunities provided by the management system are utilised effectively, for example via staff development, communication, opportunities for innovation, as well as business prospects.

In the case studies (Sammalisto, 2001), it was interesting to note that human and monetary resources, although important, were not decisive factors in the implementation of a management system. Customer requirements were known to be an important driver for the implementation of certified quality management systems within companies. However, at the time of the case studies (1997-1998), customer requirements, as driving forces for implementation of an EMS, were not as important as initially expected.

On the other hand, it was observed that environmental legislation was considered to be a strong driving force for the case companies. One reason for this (at the time) was probably that the new Swedish Environmental Code was anticipated to be introduced in the near future. Small- and medium-sized companies therefore expected higher pressure from environmental authorities. Such expectations have not materialised to a larger degree, but today customer requirements are perceived as one of the most important factors for implementation of EMS in companies. Especially for companies located 'down-stream' in the supply chain.

In the case studies, it was observed that the employees demonstrated a clear understanding as to whether managers showed 'real' commitment to the EMS, or if they just expressed the commitment in 'empty words'. Employees also showed a positive interest to participate in environmental activities and improvements. The case studies therefore indicated that a committed management team had a great possibility to create the preconditions for the successful implementation of EMS within a company, by allocating resources and by utilising the interest of the employees in environmental issues. This is clearly in line with what is stated in ISO 14001. The standard emphasises management commitment at all levels, but also the involvement of the employees in environmental work.

6.5.2 EMS at universities compared to industry

The step-wise approach to implementation of EMS (Figure 1-2) is applicable to industrial and public organisations. Also the application of the elements of ISO 14001 is similar in industry and universities. However, there are some important differences that are discussed in further detail below. These are for example:

- Different *external and internal driving forces* in industry and universities. The customer requirements are, for example, rather weak in universities compared to industry.
- Different *management culture and organisation*, including the attitude to education and training of the personnel.
- Focus on different *environmental aspects*. Indirect aspects of education and research are, for example, specific for universities.

Different driving forces

Financial driving forces

One important driving force for industrial companies to implement EMS is to contribute to profits and to meet the customers' requirements. However in universities there is a lack of financial incentives to implement EMS. The tax-based public funding for universities, which is based on Government allocation, has not increased proportionally with the increased number of students which now enter higher education. Most changes, for example, the implementation of the Governmental EMS Directive, are therefore expected to take place within a given financial frame. Further, the reduced public funding for research has also increased the financial burden on universities (Sammalisto & Brorson, 2006).

Students as driving forces

The role of university students, as driving forces for sustainable development, may be limited by the relatively short time they stay at the university and on the current attention (low or high) in society to environmental issues. Experiences from the case study in Gävle found considerable variations, from one student batch to another, as to their engagement in environmental issues.

In a broader perspective, there are, however, good examples where students' involvement in sustainable development did contribute to positive changes

in universities. For example, student-initiated education for sustainable development (ESD) initiatives like CEMUS in Uppsala and DHO in the Netherlands. On the other hand, students, who are 'buying' an education can be seen as customers of universities. As the need in society for environmental competence increases, the external interest in students with a documented competence in environmental and sustainability issues is also likely to increase. Conversely, if students, based on their education, are more aware of issues related to sustainable development, they will choose companies that work more seriously with sustainable development and in turn, exercise a market pressure on their future employers.

Different management culture and organisation

Different purposes of the organisation

There are several ways to describe organisations in a society. According to Forssell & Jansson (2000), the purpose of a company is to yield profits and to satisfy the owners' and shareholders' interests. Conversely, universities exist for the purpose of executing decisions, that is, providing higher education and research for the benefit of society. The target groups can also differ, customers and citizens respectively, although these roles can overlap. Revenues are the mode of financing for companies, whilst primarily taxes fund public universities. Finally, the basic norms for companies and universities are efficiency and justice, respectively.

Management structures

The positive results of a change process, such as the implementation of an EMS, are often dependent on how well the change can be integrated in the regular structures of an organisation. Industrial companies are often organised in clear chains of command. In comparison to that, universities are characterised by unclear, or non-existent, management structure. This may sound negative, but such a structure may be well-suited for administration of education and research (Forssell & Jansson, 2000). However, in an individualistic organisation, the implementation of EMS may be seen as a threat to 'your' personal expertise or to the loyalty of your specific discipline (Mulder & Jansen, 2006; Sammalisto & Brorson, 2006). The role of top management in universities is therefore important in creating a vision for environmental improvements and to establish the understanding of the importance of change towards sustainable development. This, in turn, requires sensitivity and courage to take a

leadership position in an academic organisation with its culture of collegial decision-making.

Environmental training of employees

Implementation of an EMS means a significant change in an organisation. In both industry and in universities, the active and visible engagement and support from top management is essential (Sammalisto & Brorson, 2006; Sammalisto, 2007a). This can be seen, for example, in training and communication, which play an important role in organisations in both sectors. This is done, both by making the staff aware of the EMS, as well as understanding the purpose of the change and what is now required of them. The support can also be seen in appointing clear responsibilities and making available resources for those who are leading the implementation work (Sammalisto & Brorson, 2006).

The methods for training management, faculty and staff in both sectors are generally the same, but training in universities provides more of a challenge. The participation in training for EMS, in industry, is seen as included in one's regular tasks and it is possible to make participation compulsory. The higher participation in EMS training by the staff in the administrative departments of a university can be compared to the staff in companies; both groups can do it in the frame of their regular activities. From faculty there is a strong resistance to accept and participate in such activities in universities, in the name of academic freedom. Further, the time spent in training, which is not considered a priority, reduces the already limited time for education and research. The training must therefore mainly take place during regular meetings and be adjusted to the academic traditions of discussion and debate, and thus stimulate the creativity of faculty with minimum bureaucracy (Sammalisto, 2007a; Sammalisto & Brorson, 2006).

Follow-up

For industry, follow-up is a natural part of business, in order to be able to make quick changes and retain efficiency and competitiveness. A number of tools and management systems have consequently been developed for this purpose. Universities, often tied to the availability of public financing, are not in the same way subject to fast changes. This can also reduce their interest in follow-up. Furthermore, the fact that it is extremely unusual for the management of a university to receive any questions regarding their EMS process in relation to their budget dialogues, and that the only related

feedback comes in the not-so-widely-read Swedish EPA Report, do not constitute strong drivers for university management either.

Focus on different environmental aspects

Direct environmental aspects are likely to dominate in industry and in the service departments of universities. In the departments engaged in natural sciences, medicine and technology, it is also relatively easy to see the connection to the disciplines and their structured way to work (Sammalisto & Lindhqvist, 2007). In departments dealing with social sciences, on the other hand, words and their definitions play an important role. The indirect aspects and dimensions of sustainable development, other than solely the environment, dominate. In this respect they are similar to R&D departments of industries and need more time to discuss and to see the relevant connections to sustainable development. From industry, universities can learn a more structured way to work, and see the opportunities of such an approach, instead of taking this as a threat. This does not need to compromise academic freedom or creativity. Industry, in their turn, can learn from universities how to work with other dimensions of sustainability and interactive training methods and evaluation.

6.5.3 Success factors for the implementation of ISO 14001

The following factors have contributed to the successful implementation of ISO 14001 at the University of Gävle:

Before implementation

- The decision to implement ISO 14001, aiming at certification in 2004, was decided by the University Board in 2001.
- The President appointed a faculty member to act as the management representative for the EMS, and to lead the implementation process (50% of her time).
- The Environmental Council was formed with representatives from all of the departments of the university. Students were also represented in the Council.
- Environmental reviews (conducted in 1996 and 1999) were revised and updated accordingly.

- A project group was formed that consisted of a project leader, two lecturers in environmental management, a staff member, an industry representative, and two students.

During implementation

- The project leader reported directly to the university president. This facilitated environmental communication between top management and the rest of the university. Information about the progress of the implementation of EMS was frequently presented to faculty and staff.
- The university's management group, including the heads of the departments, participated in environmental training. The Environmental Council received environmental training as a part of their meetings.
- The above trainings formed a base for the training of all faculty and staff at the university. The head of each department was responsible for environmental training of his or her employees. Training in regards to environmental legislation and other requirements was conducted for the management group and special functions. Internal auditors were trained and external participants were included in the training.
- Theme days, breakfast meetings, etc., regarding topics related to environmental issues and sustainability were organised in cooperation with local industry and NGOs.
- The Environmental Council was an effective forum for environmental coordinators in order to exchange experiences and knowledge.

After certification

- At the end of 2005 the Vice President of the university took over as the chairperson of the Environmental Council. One person (25% of time) was appointed to be responsible for the maintenance and development of the EMS.
- Sustainable development was included in the revised version of the environmental policy already in 2001, so it was relatively easy to move the focus to the wider concept of sustainability and "bolt-on" the sustainability issues as they are at the present. Environmental training and communication continues. Now with more focus on sustainability.
- The Management Group frequently receives updates of environmental legislation and the progress of the EMS. Internal and third-party environmental audits are frequently conducted.

(i) top management commitment, (ii) relevant resources for implementation and maintenance of the EMS, (iii) team work at different levels of the organisation, (iv) communication, (v) environmental training, (vi) follow-up and feedback, and, (vii) internal and external audits. The above factors are more or less equal to the factors for successful implementation of an EMS in industry.

6.5.4 Problems observed during the implementation of ISO 14001

There were also a number of problems associated to the implementation of ISO 14001 at the University of Gävle, for example:

- Relevant environmental data was not available at the beginning of the project.
- The allocation of environmental responsibilities was unclear. This included administrative departments, academic departments, and the landlord.
- There was scepticism to the project in some departments. Major concern was about “a system of some kind” to control the employees. Some individuals saw the EMS, and the audits, as controls limiting their academic freedom. Faculty representing departments of natural and medicine sciences, and technological departments were more accustomed to the requirements of a management system and the need of more formal routines. Obviously, some members of faculty and staff “did not want anyone to come and say what to do”. On the other hand, they “wanted someone to tell them exactly what to do”.
- Students’ involvement in the EMS has varied over the years. Initially, students participated in the project group, the Environmental Council and the implementation of the EMS at large. In 2005-2006, it was almost impossible to find students to be involved in any environmental work or agendas at all. At present there is one representative involved in the Environmental Council.

6.6 Using the analytical framework

The study is an attempt to evaluate the effects of efforts made today, while working for change in the future. For this purpose, the theory-based evaluation research for public intervention has proven to provide an opportunity to construct a model for the study. This model (cf. Figure 3-2)

for development of sustainability in universities within an EMS structure has provided a reasonable causal chain, an intervention theory, for this study. The model could well be applied in other universities.

Evaluation requires some criteria against which the “merit, worth and value of things” are determined (Bemelmans-Videc, 1998, pp. 7-8). This study has focussed on the *effectiveness*, that is, the level of reaching the goals, without regarding the costs, of the Swedish Government’s EMS Directives. As the discussion in sections above indicates, the EMS Directives alone have not been as effective as intended. They have initiated change in many universities, but no action in other universities. The Directives, together with a certification decision by the university management, have, however, been quite effective in the change process, which in the long-term can lead to a more sustainable society.

As Weiss (1997, pp. 515-516) states, there should be openness for change as new goals are set and interim markers for the evaluation emerge on the way, since it provides opportunities to gain increased insight into the change process. In this study the initial focus on EMS implementation, based on the Government Directives, was developed further to that of sustainable development based on the amended Higher Education Act.

6.7 A model for education for sustainable development

Sterling’s (2004) model for integration of sustainability in education can be seen in three stages. Many universities in Sweden appear to be moving from stage one, “bolting-on” via separate courses, to reformation, that is, “building-in” ideas into the existing system by integrating sustainability content in education. The transformation, redesigning of education based on sustainability principles, seems still to be far away in the future. As all external influences, the quest for sustainable development is easily seen as a threat to academic freedom, and a radical change may be required to force us, in academia, to adapt to the life sustaining system of the globe, rather than exploiting and neglecting it. There will always be a need for deep disciplinary knowledge. However, it may have to be organised in a different way to accommodate the needs of education for future decision-makers incorporating sustainable development. But also in this context, it is important to remember that improvements of the campus management

operations at the universities, such as savings of energy and paper, can contribute to making the efforts visible to students, faculty and staff.

A model of education for sustainable development, “building-in”, is illustrated by Figure 6-1. Students enter university (in the middle) and are divided into studies in various disciplines within their special courses. They learn about sustainable development in relation to their subjects in education for sustainable development and leave with sustainable development knowledge, understanding and action competence as future decisions makers in society. It remains to be seen, how to illustrate Sterling’s third stage, that is, how education as sustainability will look like.



*Figure 6-1. Model for Education for Sustainable Development (ESD).
Source: The author.*

Although sustainable development can be seen as an ‘opportunistic political term’, the need for it is becoming more and more apparent with increased attention to climate change and pollution that endangers access to clean air, water and food for everyone. It is also apparent that we need to adjust our lives and consumption patterns to the limits of the planet’s life-support system.

The present work of adjusting higher education to the Bologna Model is a major change in the European education systems, and it can provide a unique opportunity to incorporate ESD (Mulder & Jansen, 2006). Moreover, we will also have to keep in mind that sustainable development is a dynamic

concept (Holmberg & Samuelsson, 2006) and future research will likely provide ample opportunities for discussions and, consequently, will sustain the work and keep continuous improvement in order of a real EMS spirit alive.

CHAPTER SEVEN

7. Conclusions

The purpose of this thesis is to contribute to the knowledge and understanding of the implementation of environmental management systems in universities and how they can act as a tool to integrate sustainable development in higher education. Four main research questions were formulated to reach this purpose. These questions and the answers obtained during the research will be presented below.

Why do universities work with environmental management systems?

This question contains the following sub-questions: *What are the main drivers and barriers for the work?* and *Have the Swedish Government Directives been effective in this process?*

The Swedish Government Directives have functioned as an external ‘spark’ for most universities to initiate implementation of environmental management systems (EMS). The Directives have not, however, been a fully effective driver and the actions taken at the various universities are largely a result of internal drivers based on the commitment of management, faculty, staff and students. The presidents and other top-management officials have a key role to play and they are thus instrumental in creating an institutional drive and corresponding culture of change.

The lack of feedback and follow-up from the Ministry of Education has reduced the effectiveness of the Directives as an external driver. The feedback could be improved, for example, by asking the question “How are you working for sustainable development at your university?” to those involved with university management in the annual follow-up dialogues, as based on the appropriation directions. The Ministry could also organise formal audits of the implementation of EMS at universities.

The amendment of the Higher Education Act in 2006 is also likely to prove to be a weak driver, unless it is accompanied by clear requirements to the

universities in the form of appropriation directions, and accompanied by follow-up and feedback from the Ministry of Education.

How do universities work with environmental management systems?

This question includes the sub-question: *Have the environmental management systems resulted in any improvements in direct environmental impacts in Swedish universities so far?*

Most universities use the EMS-like structure to support the work; however some of them deviated from this structure, at least in the beginning, by not prioritising their significant environmental aspects as a basis for their continued work. It is apparent that those universities, where a management decision for a certification according to ISO 14001 was made, have had a clearer focus and allocated resources for related activities. Such universities have also, after reaching certification, continued the work with the indirect aspects through classification of education and research for environmental and sustainability-orientated content in an effort to promote education for sustainable development.

There are tangible results pertaining to the work with the direct environmental aspects and many universities can report reduced use of energy and chemicals, as well as reduced waste management costs due to recycling, etc.

Can an environmental management system be a way to institutionalise work for sustainable development, including education for sustainable development, in higher education?

An EMS provides a structure to work with integration of sustainable development in universities. A certified EMS with regular internal and third-party audits provides a system with continuous feedback and follow-up. Training is an integral part of an EMS and is especially important for faculty, in order to stimulate them to see the connection of their own work and particularly in disciplines related to achieving sustainable development.

The connection of education and research to the concept of sustainability, as well as to the tangible environmental activities of the university, however, needs to be clarified further. It is apparent that there has been a problem in clearly communicating the purpose and role of the EMS in the long-run. EMS and training are sometimes seen as solely an aim in itself, based on a command from management.

As the work with indirect environmental aspects develops, other dimensions of sustainability may get greater attention. Education and research are important activities, where universities can make a major contribution to sustainable development in the long run. Although the future results of the content related to environmental and sustainability in these activities cannot easily be measured, the level of integration of such content in them can be evaluated. This should preferably be done by the lecturers and researchers themselves, since it provides opportunities for continuous reflection and thus development.

The main challenge lies in getting the discussion pertaining to environmental and sustainability issues to become ‘an academic matter’. An EMS can contribute to this by placing sustainability on the agenda, as is demonstrated by the case in industry. But in addition to being on the management agenda, environmental and sustainability issues also need to become part of the academic agenda in higher education, taking the focus from the EMS itself and making sustainability a part of the role of academia and its development for the future.

Here the results of the emerging scientific studies pertaining to sustainable development in different disciplinary contexts can make a contribution to the discussion of the issues amongst colleagues and students. The learning of students, from the beginning to the end of their studies, can also be explored, for example by using survey and interview techniques.

The often ‘lonely’ function of environmental coordinators and managers could be developed further, along with top management support, to utilize their function as knowledge banks and brokers for sustainability in their universities and in the society surrounding them. This then could be based on their experiences with the EMS and its structured way to work. Today networks with colleagues at the home university and at other universities contribute by providing support and opportunities to share experiences.

What can universities and industries learn from one another in environmental management system implementation?

This question has the sub-question: *How does implementation of environmental management systems differ in a university-setting versus industry?*

Universities can learn from industry regarding how to implement a more structured way to work, and that even when initiated from outside, an EMS

does not need to be a threat to academic freedom. Follow-up and feedback can also provide opportunities for academic reflection, if seen as an opportunity, rather than a form of control.

The more interactive training forms, active discussion and a critical approach to sustainable development can be a contribution from universities to companies. The different disciplinary perspectives can open opportunities for companies to work with the wider concept of sustainability, including also the economic, social and cultural aspects, which are still rather unfamiliar to many companies.

With the lack of traditional market incentives (such as customer requirements) there are, compared to industry, few incentives for the management body of a university to work to achieve sustainable development. Instead the work must rely on their personal engagement and occasional pressure from students, who through their demands can initiate and support change. Although there are some good examples, a limitation of the students acting as a driving force is the fact that their engagement is limited to the time of their studies at the university. This period is often not long enough to make a significant contribution to the institutionalisation of the work. There are also considerable variations in the student engagement from one 'batch' of students to another. As the need of sustainable development becomes more apparent in society, students well-versed in sustainable development will play an important role.

The success factors for EMS implementation in university can be summarised in generic terms as follows: (i) top-management commitment, (ii) relevant resources for implementation and maintenance of the EMS, (iii) team work at different levels of the organisation, (iv) communication, (v) environmental training, (vi) follow-up and feedback, and, (vii) internal and external audits. These equal the factors for successful implementation of EMS in industry, although awareness and sensitivity of the special conditions pertaining to the implementation of an EMS in an academic context are also required.

Recommendations to stakeholders

For the decision-makers on the national level, it is important to provide some drivers to university managements, if real change for sustainable development is intended. If positive monetary incentives cannot be

provided, follow-up and feedback give incentives via encouragement, as it becomes obvious that planned positive changes have taken place or, in the opposite case, that a change of direction and improvement is needed. This can constitute necessary incentives, even within a far reaching delegation.

Decision-makers in universities, as well as in various regional and local authorities, can also have advantages related to follow-up and feedback, as stated above. Peer-reviews, a well-accepted method of scientific evaluation of research, have many similarities to the administrative audits of a management system. They both pay attention to content and form. A focus on the similarities, for example the feedback for improvement, and further development of audits in an academic context, can improve acceptability in academia.

Those working with implementation of various policies in universities can learn from the method of evaluation used in this study, which has many similarities to management system audits. They also need to ascertain the support of top management *prior* to their commitment to implementing changes and making use of the support and experiences of their colleagues in various networks.

The following recommendations for the implementation of ISO 14001, which can contribute to education and research for the sustainable development, can be made based on the case university:

Before implementation

- Take a certification decision to the highest level, for example adopted by the University Board and include the aim of sustainable development already in the beginning, for example in the University's policy.
- Appoint a faculty member as the management representative for the EMS process with resources to engage others in the activities that are common to the whole university.
- Have all departments and students appoint their representatives in an Environmental/Sustainability Council.

During implementation

- Ensure and allow time for good communication by having the management representative report directly to the President, using various meetings to discuss the EMS process with faculty and staff, and

by organising theme days, breakfast meetings, etc., about environmental and sustainability issues in cooperation with local industry and NGOs.

- Provide a 'compulsory' basic environmental training for the whole university Management Group, the department heads, the Environmental Council, as well as all faculty and staff. This should include special training pertaining to legal requirements for those concerned and for internal auditors.
- Assure that the responsibilities based on the EMS are clearly delegated within the organisation, for example the training of faculty and staff to each department head. The central project leader is responsible for coordination and support.

After certification

- Appoint a senior faculty member as the management representative, and if necessary, have another function responsible for the maintenance and development of the EMS.
- Move the focus gradually to the wider concept of sustainability in various forms of communication.
- Continue the basic training for new members of faculty and staff and provide 'update' training regarding legislation, and internal auditing for those concerned.
- Continue the regular internal and, if certified, third-party environmental audits.

The problems observed during the implementation of ISO 14001 at the case university could be summarised in the following points:

- The problems caused by a lack of relevant environmental data and the unclear allocation of environmental responsibilities between different departments and the landlord required time to solve.
- The scepticism regarding the EMS implementation and various persons both wanting and not wanting to be told "exactly what to do" was apparent in some departments.
- Audits and routines were seen as a form of control, and consequently limiting the general 'rule' of academic freedom.
- The student involvement has varied greatly, between years.

7.1 Contributions of the research

This study provides empirical data and analysis relating to the implementation of EMS, in order to support integration of environmental and sustainability concerns in higher education in Sweden. It evaluates, in more detail, examples of methods for training, communication, and working with indirect aspects in institutions of higher education.

This study contributes to the limited number of detailed early evaluations regarding environmental interventions and it demonstrates a way to assess the effectiveness of a government directive, and an environmental policy, and how they can contribute to achieving sustainable development within a society. It also describes a method to assess the progress of intangible, environmental and sustainability impacts with interim markers utilising multiple sources of data methods and collection.

The study also contributes, by comparing industry and universities, to the understanding of how an EMS is implemented and maintained in different types of organisations.

7.2 Suggestions for further research

It would be interesting to further analyze how students develop their knowledge and awareness as to how to achieve sustainable development during their study periods at a participating university. A comparison could be made between students in programs with and without intentional sustainability integration, as well as between different universities.

Another interesting area for further research would be the work with education for sustainable development in universities following the initial, and often intensive, implementation phase of environmental management systems.

It could also prove helpful to study the drivers and barriers at different institutions and compare the outcomes. This would provide knowledge and understanding, based on the following question: why did it turn out like this? An example of this could be to make a more detailed study of the EMS Directives of the Swedish Government, its background, and the related processes to achieve the output.

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Appendix A – Survey: Drivers and barriers in the environmental management work in universities

I am studying in my research differences in the environmental management systems implementation between industry and universities. On area where there can be differences are the drivers and barriers for the work.

I would appreciate it if you could answer the following questions from your function in the work for environmental management system at your university.

Kaisu Sammalisto, University of Gävle, kso@byg.se, 026-250696

What are the five most important drivers for the EMS work at your university?	How strong is the driver on a scale 1-5 (1 weakest and 5 strongest)
What are the five most important barriers for the EMS work at your university?	How strong is the barrier on a scale 1-5 (1 weakest and 5 strongest)

University _____

Name _____ Tel _____

Mobile _____ Mail _____

Would it be possible for you to answer some further short questions by phone or mail?

Yes _____ No _____

Appendix B – Survey: Connection between EMS and ESD

A warm October greeting to all you members of the MLUH network!

We live in an exciting time with our new decision makers, and this can mean a lot of changes to our work. As many of you in MLUH know I am finishing by thesis on environmental management system as a way to work towards sustainable development in universities.

*I would now appreciate your help to learn about the situation at your university. Send your reply by e-mail to Kaisu.Sammalisto@hig.se (tel: 070-608 1333) **not later than 13 November 2006.***

University:	Date:
Contact person:	
Name:	
Function:	
e-mail:	
Tel:	
Mobil:	

Do you work with **direct** environmental aspects in your EMS?

What are the most important improvements within the direct environmental aspects since your started working with your EMS?

Do you work with **indirect** environmental aspects in your EMS?

Why? Why not?

Does your university have a **policy for sustainable development**? (attach a copy or a link)

Does the policy include also education and research?

Do you have any **tools** to work with education and research for sustainable development?

Which?

What are your strongest **drivers** to work with education and research for sustainable development?

What are your strongest **barriers** for the same?

From where do you as environmental coordinator **get support** for your EMS work?

From where do you **lack support** for your EMS work?

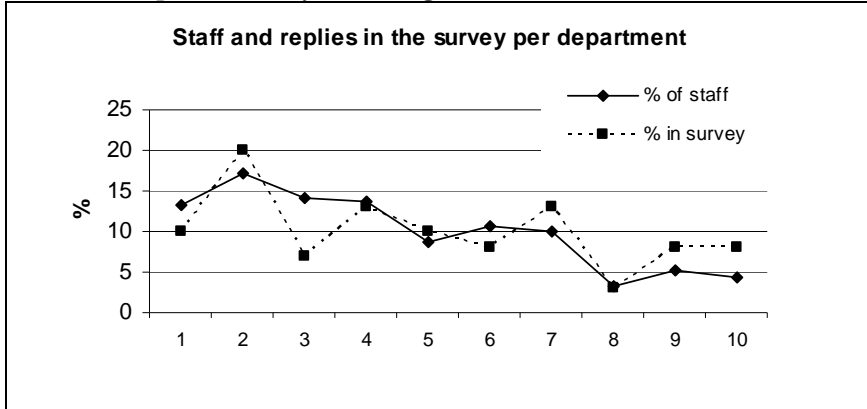
What do you think could be done at the **Government or Ministry** level to make the work for sustainable development easier in universities?

What do you think could be done at **your university**?

How could we **see** and **evaluate** in the future if a university has been successful in its work for sustainable development?

Appendix C – Survey: Environmental communication, training and awareness at University of Gävle

1. What department do you belong to?



2. Which function do you have?

1. Chef/Head of department
2. Environmental coordinator
3. Lecturer
4. Administrator
5. Laboratory staff
6. Service
7. Other

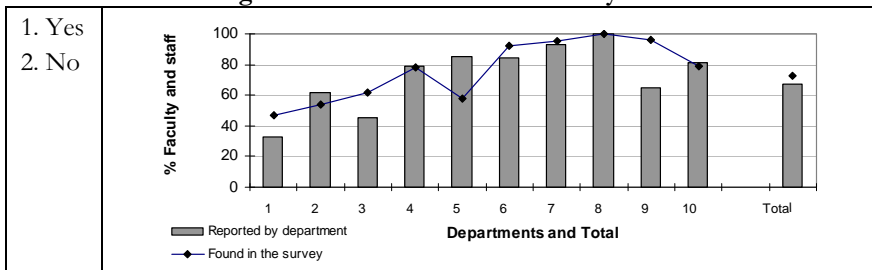
3. Sex

1. Female (55% in employment statistics 20040101)	HiG maj 2004 373 51%
2. Male (45% in employment statistics 20040101)	362 49%
	735

4. Age



5. Have you participated in any environmental training related to the environmental management activities at the university?



6. How many training opportunities have been provided?

- 1. 0
- 2. 1
- 3. 2
- 4. 3 or more

7. If you have participated in the environmental training, what is relevant for your tasks?

Extremely Very Relevant Little Very little

8. If you did not participate in the environmental training what was the reason?

- Lack of time
- Lack of motivation
- Holiday/sick leave
- Other

9. Are you aware of the university environmental policy?

- 1. Yes
- 2. No

10. Are you aware of the university environmental objectives?

- 1. Yes
- 2. No

11. Have your tasks been affected by the certification?

Very much Much To some degree Little Very little

12. Are you aware of which routines concern your tasks?

- 1. Yes
- 2. No

13. To what extent have you participated in crating the course classification etc for your own tasks?

(Note, this question was omitted based on its unclarity due to a typing error)

Great Large Some Small Very small

14. How much are you responsible for the environmental activities of the university?

Very much Much To some degree Little Very little

15. How much support do you have for your environmental responsibilities from your managers and supervisors?

Great Large Some Little Very

16. Which factors and to what degree interfere with your personal ambitions for the university environmental activities?

Lack of:

Time Information Support Knowledge Personal interest

Greatly Largely Average Little Very little

17. Do you see a clear connection between university environmental activities and your own tasks?

- 1. Yes
- 2. No

18. The university environmental activities aim at contributing to the sustainable development of the society. Can you contribute to the sustainable development in your daily work? In which area?

Education Research Collaboration Service Other

yes partly no don't know not relevant

19. Are you motivated to contribute to the environmental activities of the university?

1. Yes

2. No

20. Do you know where to find the documentation for the university environmental activities?

1. Yes

2. No

Appendix D – Course classification form

What do we mean by environmental/sustainable development content in courses?

Environment and sustainable development are concepts that can be defined in different ways and the work for environment/sustainable development at University of Gävle does not aim at using one single definition. Our starting point is the Swedish Environmental Code, but we will, at the same time, work towards the wider perspective of sustainable development as defined by the Bruntland commission, the base for the Agenda 21.

<p>STARTING FROM →</p> <p>Sustainable development ensures a healthy environmental impact on both the current and future generations. This is based on the understanding that nature is worthy of protection in its own right, and that man's right to exploit nature carries with it a responsibility.</p> <p style="text-align: right;"><i>Swedish Environmental Code 1§, 1cb</i></p> <p style="text-align: center;">→ AIMING AT</p> <p><i>Sustainable development meets the needs of the present without compromising the ability of future generations to meet their own needs.</i></p> <p>Sustainable development has three integrated parts: 1. ecological sustainability, 2. social sustainability 3. economic sustainability. Often a fourth dimension, cultural sustainability, is added.</p> <p style="text-align: right;">Agenda 21</p>
--

This means that the teachers (together with their subject groups) shall classify the courses they are responsible for in different categories based on their environmental (E) and/or sustainable development (SD) content, and based on the definitions of sustainable development above and in accordance with the Policy for Environment and Sustainable Development at the University of Gävle.

Course code: _____ **Course name:** _____

The classification of the course is indicated by marking one of the following alternatives:

A.	B.	C.	D.
<i>A major part of the course has E/SD content</i>	<i>The course has some E/SD content</i>	<i>The course has not yet any E/SD content, but has the potential for that</i>	<i>E/SD content is not relevant for the course.</i>

Motivation for the classification: _____

Signature of the classifying teacher

Date

Appendix E – Interview: Course classification

Interview questions concerning course classifications at University of Gävle in August 2006.

The procedure

How was the classification made and by whom? Was it discussed?

How was the course classified?

Barriers

Was the classification difficult, any problems? Does it take much time?
Is it difficult to understand?

Drivers (why is it done?)

Has it resulted in any changes in your courses?

The usefulness of the effort?

Do you know what happens with the forms afterwards?

Have you received any feedback on the results?

How could the classification be formalised? (to discuss in groups which assess course plans?)

Definition of sustainable development?

What is sustainable development?

Appendix F – Appended papers

The following articles and conference papers are appended to the thesis:

- Paper I: Sammalisto, K. & Arvidsson, K. (2005). Environmental management in Swedish higher education: directives, driving forces, hindrances, environmental aspects and environmental coordinators in Swedish Universities. *International Journal of Sustainability in Higher Education*, 6, 1, 18-35.
- Paper II: Sammalisto, K. (2004). *From Government Directive to Sustainable Development in Swedish Universities*. Conference paper presented at the EMSU conference in Monterrey, Mexico, June 9-11, 2004 (with minor editorial revisions in June 2007).
- Paper III: Sammalisto, K., & Brorson, T. (2006). Training and communication in the implementation of environmental management systems (ISO 14001). A case study at the University of Gävle, Sweden. *Journal of Cleaner Production*, Available online 28 September 2006.
doi:10.1016/j.jclepro.2006.07.029
- Paper IV: Sammalisto, K. & Lindhqvist, T. (2007). Integration of sustainability in higher education: A study with international perspectives. *Accepted for publication in Innovative Higher Education*, 32, 4.
- Paper V: Sammalisto, K. (2007a). *Drivers and strategies for education for sustainable development*. Paper accepted for presentation at the International Advanced Research Workshop on Higher Education and Sustainable Development, HESD, in Maribor, Slovenia, March 29-30, 2007 (with minor editorial revisions in June 2007).

Paper I

Sammalisto, K. & Arvidsson, K. (2005). Environmental management in Swedish higher education: directives, driving forces, hindrances, environmental aspects and environmental coordinators in Swedish Universities. *International Journal of Sustainability in Higher Education*. 6, 1, 18-35. Reprinted with permission from Emerald Group Publishing Limited.



Environmental management in Swedish higher education

Directives, driving forces, hindrances, environmental aspects and environmental co-ordinators in Swedish universities

Kaisu Sammalisto and Karin Arvidsson
University of Gävle, Gävle, Sweden

Abstract

Purpose – This study of environment management systems implementation in Swedish universities contributes to the dialogue about the role of management systems as tools in developing sustainability in higher education.

Design/methodology/approach – The empirical study is based on Government directives that make environmental management systems implementation compulsory for all public organisations in Sweden, annual environmental reports of Swedish universities for the years 1997-2002, their internet home pages, and a survey.

Findings – Many universities focus only on direct environmental aspects like paper use and waste handling, even though the main tasks of the universities, namely education, research and co-operation with the surrounding society, that is the indirect aspects, are likely to have a considerable environmental impact. The organisation of the environmental work and the placement of the environmental coordinator also vary. Two main patterns appear; the coordinator has a function in the service department or an administrative function in the president's office. The goal of certification increases the likelihood of the environmental coordinator being placed in the president's office.

Originality/value – The aim is to increase the understanding of why and how a concept that was first introduced in industry is applied to institutions of higher education.

Keywords Environmental management, Universities, Management techniques, Sweden

Paper type Research paper

Background

Individual learners should have such skills and competence relevant to their future professions and future roles as decision-makers. Higher education should also play an active role locally, nationally, and internationally in enhancing knowledge and action competence regarding sustainable development through research and education in co-operation with surrounding society (Baltic 21, 2002, section 3.2.3).

This overall goal for the education for sustainable development for higher education expressed by the Ministers of Education of the Baltic Sea countries follows the intentions in Agenda 21 (United Nations, 1992) and was globally confirmed again in the World Summit in Johannesburg (United Nations, 2002), where the issue was highlighted by, among others, the Swedish Prime Minister:

I would like to see more teachers discussing the impact of our lifestyles on the environment. Universities should offer courses on global survival issues and sustainable development in all major programs (Persson, 2002).



As a result of the conference, the years 2005 to 2014 will be the United Nations Decade of Education for Sustainable Development (MOFA, 2003)

As early as in 1996 the Swedish Government appointed the public authorities role models in contributing to the long-term sustainable development of society (SOU, 1996, p. 112). As a first step to meet the commitment, a directive was given to public organisations to implement a number of core elements of an environmental management system (policy, environmental goals, etc). Environmental management (EM) in public authorities “should be based on the same principles as those in industry but adjusted to the activities of the public agency”. Certification of the system was not required. In the initial directive, 25 authorities were engaged and now 242 public agencies and institutions are involved in environmental management activities (SNV, 2003a). Two universities were among the first to be authorities chosen to represent different types and sizes of organisation and they had themselves shown interest in participating in the project. Later on, another 33 of the total of 41 universities, with about 330,000 students and about 50,000 faculty and staff organisations, got the assignment. (SCB, 2003) The five arts and sports universities were considered to have less environmental impact and are therefore only obliged to implement a simplified EMS (Miljödepartementet, 2001a).

While the public agencies in Sweden are taking steps to implement EMS, many industrial companies all over the world have gone further so that more than 53,000 organisations have met the requirements of ISO 14001 since early 1990 s and more than 3,700 European companies have been registered according to the EMAS regulation. (SIS, 1996; Peglau, 2003). The main driving forces for the implementation of ISO 14001 in industry are to satisfy customer requirements, to ensure legal compliance, to improve risk management (e.g. reduce risk for uncontrolled emissions), to improve public image, and in a systematic way utilise the potential to save money and natural resources (Brorson and Larsson, 1999; Almgren and Brorson, 2003).

Also, ten Swedish public organisations, or some parts of them, have now reached certification of their environmental management system (SNV, 2003b). One of the main actors in the field, the Swedish Environmental Protection Agency, passed the ISO 14001 certification audit in March 2003. In higher education (HE) in Sweden, courses on environmental policy, environmental management and environmental auditing are available at a majority of the universities. However, only two organisations have reached certification. Mälardalen University was certified according to ISO 14001 in 1999 (Mälardalen, 2003) and a section of Mid Sweden University was registered according to EMAS in 1998 (Mitthögskolan, 2003). Three more have expressed an ambition to get their EMS certified during 2003 and 2004.

ISO 14001 is an example of modern management concepts and methods that have been designed to increase the efficiency of operations in companies and that are being adopted also in public agencies as they are expected to “produce” with smaller resources more cured patients in hospitals, import and export control in customs services, or educated students in universities. A structured management system is expected to help them in this change. These change processes, which a management systems implementation represents, has been studied from different perspectives. Practical implementation has mostly been studied in industrial companies. Carlsson (2000) concludes that the problems, barriers and opportunities depend on the approach used for the system implementation. Quality management systems have been

considered also in university contexts by Giertz (2000) and Karapetrovic and Willborn (1999) for instance. Karapetrovic, for example, concludes that universities can learn from business companies in their management systems implementation, especially since the gap between the markets in which universities and business companies are operating appears to be closing.

The annual government directives state that public authorities are to integrate EMS in their regular activities (Miljödepartementet, 1996, 1997, 1998). In this context, the integrated environmental management system in universities is seen as a tool for systematic integration of sustainability aspects in the education and research processes, as well as offering a structured approach to reduce the environmental impacts at campuses. Although there are no implications that the striving for sustainable development requires an initial process of EMS implementation, this process can serve to create structure for the work. Aiming at certification can serve as an intermediate goal in this process by laying focus on the issues, getting the work started, getting resources and priorities for the work.

Even though most Swedes see themselves as environmentally aware and even though there is no problem in gaining acceptance for environmental efforts as such, the implementation of an environmental management system at work can be a totally different matter. In universities the EMS must be applied under the special circumstances that prevail in the academic world. It is a concept, which requires clear and documented structure, routines, follow-up and chain of command. Academic organisation on the other hand are characterised by collegial decision making, which is discussed in almost all literature dealing with higher education (Bowen and Shapiro, 1998; Fritzell, 1998; Ramsden, 1998). It is one of the cornerstones of academic organisations and can result in untransparent decision making and an unclear chain of responsibility (Högskoleverket, 2001). The president and academic leaders do not have the same kind of executive power as managers in business companies, which is bound to have an effect on an EMS implementation (Sammalisto, 2003).

Although the change due to EMS implementation in itself is not radical, it is likely to meet resistance, which also depend on where the focus of the EMS is being placed, i.e. which environmental aspects the university is working on. The driving forces for the change indicate the way the process is driven and accepted, and the hindrances again reflect the problems in acceptance.

The implementation of EMS in Swedish industry has been going on since the middle of the 1990 s and the process has been studied quite extensively (Sammalisto, 2001; Ammenberg, 2001, 2003). The process in public agencies on local and county level in Sweden has been studied to some degree (Emilsson, 2002; Burström, 2000). At present, the Swedish Environmental Protection Agency conducts an overall evaluation of the EMS project in public agencies. This evaluation is expected to be completed before the end of 2003 (SNV, 2003b). But the universities, with their special characteristics, are still largely an unexplored area in Sweden although some studies have been found at the undergraduate level (Arvidsson, 2003). Internationally, there are some studies of higher education as regards indicators (Shriberg, 2002; Flint, 2001; Sammalisto, 2002) and studies of environmental management and environmental management systems also in other countries in institutions of HE, many of which primarily focus on cases and good examples (Leal Filho *et al.*, 1996, 2000a, b, c; Herremans and Allwright, 2000; Fisher, 2003; von Oelreich, 2002; Carpenter, 2002;

Noeke, 2002). Sharp (2002) focuses on specific university problems such as the need of questioning and changing of the established mental models, different disciplinary cultures and irrationalities and calls for greater understanding of the university culture for a change like EMS implementation.

Aim of the study

The question of what actually happens during an EMS implementation process in Swedish universities, with or without a certification, is still largely unexplored. The issue is gaining in importance since the legal requirement for the management of responsibility for environment and health and safety in Sweden also fetch their structure and approach from standardised management systems.

In this study, we will start to explore how the industrial concept of environmental management is being applied in institutions of higher education in Sweden. Our research questions mainly arise from “interested insight” based on our previous research and professional experiences in industry concerning the implementation of EMS, and the experiences of the ongoing process of implementing ISO 14001 at the University of Gävle (Sweden).

The aim of this paper is to present the situation of the implementation of structured environmental management systems in Swedish universities, and to form the basis for further studies and for the identification of future action.

Answers to the questions why and how universities are working with EMS are sought.

Method

The change process as a consequence of an EMS implementation in universities could be characterised by the following stages:

- (1) Government directive.
- (2) EMS implementation in HE.
- (3) Awareness among faculty and staff.
- (4) Greening of courses/research/campus management.
- (5) Knowledge/awareness/action competence among the students.
- (6) Decisions/actions for sustainable development.
- (7) More sustainable society.

This research focuses on the first three stages of the process. However, stages 2 and 3 will be studied further in later studies. The longer down the chain we get, the more difficult the effects are to measure and are, in fact, impossible to measure directly due to the long time frame and scope of the results. But the effort can, to some degree, be assessed via the greening of the courses, research and campus management.

Why do universities work with EMS? Although government directives are likely to play a role (stage 1), universities experience other, internal and external, driving forces, and also barriers, in their EMS implementation (stages 2 and 3). The main focus in this paper concerning driving forces and hindrances is in the years 1999 and 2000, the years when universities were especially requested to report on these issues. However, for further studies, it was considered important to a gain first insight into the development

of the guidelines for the annual reports from the universities throughout the years 1997-2002.

A survey in March 2003 was conducted with 17 university-based environmental co-ordinators to trace any possible changes in driving forces and hindrances they had experienced since 1999 and 2000. One respondent represented a campus, which is only part of a university, and one left an uncompleted reply. These two were excluded, leaving 15 complete answers for the study. The survey included the following two questions: "What are the five most important driving forces for EMS implementation in your university?" and "What are the five most important hindrances for the EMS implementation?" Data from the survey concerning driving forces and hindrances was analysed together with the data collected from the annual environmental reports for the years 1999 and 2000 (Table I).

The driving forces and hindrances were then divided into groups to cover the main areas, regardless of the exact wording used in the report. For example, image, marketing, credibility, that is, how the university is or will be seen includes also driving forces like goodwill, green profile and trade mark. The hindrances include comments on a scattered and bureaucratic organisation, on lack of environmental organisation and on the fact that the EMS is not used.

"How do universities work with EMS?" was another question in the study (stages 2 and 3). What do they focus on in their work? What environmental aspects as defined in Miljödepartementet (2000a) have the universities identified, i.e. what do they perceive to be their environmental impact, and what aspects have they prioritised, i.e. what do they see as the most significant environmental impact to be worked on? An analysis of the environmental reports could provide answers to these questions. Prioritisation would also indicate how consciously the university was working within the structured EMS cycle. Of the 35 universities with the directive to implement environmental management system, 32 submitted an annual environmental report for the year 2002. These reports provide the latest information about the environmental aspects.

All the environmental aspects were listed. The terminology used in describing environmental aspects from the different universities was somewhat more coherent than the one describing driving forces and hindrances, but some of them had to be clustered into groups. For example, chemicals and hazardous waste include also laboratory activity, and energy use includes electricity, heating and cooling of the buildings.

The annual reports also provided some information about the organisational position of the environmental coordinator, which was seen as an indication of how prioritised the work with EMS at a university is. A position in the president's office would indicate a higher priority than otherwise. Additional information about this was fetched from the internet home pages of the universities.

Other sources are the Swedish Government Directives and Official Reports (SOU), databases available at the university library of Gävle, and relevant literature.

Results

The Swedish Government issues guidelines for how the environmental work is to be reported in connection to the ordinary annual report, but these guidelines have varied over the years. In 1996, the guidelines only requested a report including the adjustment of procurement and possible cost due to EMS (Miljödepartementet, 1996). The

University	Year
<i>Requirement for EMS:</i>	
Lund University ^a	1997
Stockholm University	1997
Göteborg University ^a	1998
University of Gävle ^a	1998
Royal Institute of Technology	1998
Linköping University ^a	1998
Mid Sweden University ^a	1998
Mälardalen University	1998
Umeå University ^a	1998
Chalmers University of Technology	1999
University of Borås ^a	1999
Halmstad University	1999
Kalmar University	1999
Kristianstad University	1999
University of Skövde ^a	1999
Karlstad University ^a	1999
Karolinska Institutet	1999
Uppsala University ^a	1999
Växjö University	1999
Örebro University	1999
Gotland University ^a	2000
University of Trollhättan/Uddevalla	2000
Stockholm Institute of Education	2000
Malmö University	2000
Södertörn University	2000
Blekinge Institute of Technology	2001
Dalarna University	2001
University of Arts Craft and Design	2001
Royal University of fine Arts	2001
Luleå University of Technology ^a	2001
<i>Requirement for simplified EMS:</i>	
The Royal University of Music in Stockholm ^a	2001
University of Opera ^a	2001
University of Acting in Stockholm	2001
University of Dance	2001
Stockholm University of Physical Education and Sports ^a	2001

Table I.
List of the 35 universities with the directive to implement environmental management system by the Swedish Government, including the year they got the assignment

following year, the level of ambition was raised to report also new objectives and targets (Miljödepartementet, 1997). For the years 1999 and 2000, i.e. the years of the study of driving forces and hindrances, reporting was requested in sections (Miljödepartementet, 2000), namely:

- the work with EMS during the year, including driving forces and hindrances (1.2) for the environmental work;
- internal driving forces or hindrances, for example, the interest among staff, resources or conflicting goals;

- external driving forces and hindrances, for example directives, conflicting goals, requirements from the departments or changes in the surrounding society; and
- the initial review as well as the work with direct and indirect environmental aspects.

The following year, there was a specific request to “systematise environmental concern in regular activities and main management documents including routines for the follow up and reporting” and to review policy and objectives and targets (Miljödepartementet, 2001b). For 2001, reporting in structured tables was introduced. Further, any conflicting goals or other hindrances were to be reported (Miljödepartementet, 2001c). Clarifications concerning how objectives and targets had been reached were made the following year and, finally, for 2002, there was an option either to fill in only a table or to write more extensively. There was no mention of driving forces, but conflicting goals with the main activities of the agency or other hindrances for EMS were requested (Miljödepartementet, 2001d, 2002). It is worth noting that there are no sanctions for not handing in an annual environmental report.

Driving forces

Driving forces for the implementation of environmental management systems in Swedish universities that were reported in the annual environmental reports 1999-2000 and in a survey conducted among environmental co-ordinators in March 2003 are recorded in Figure 1.

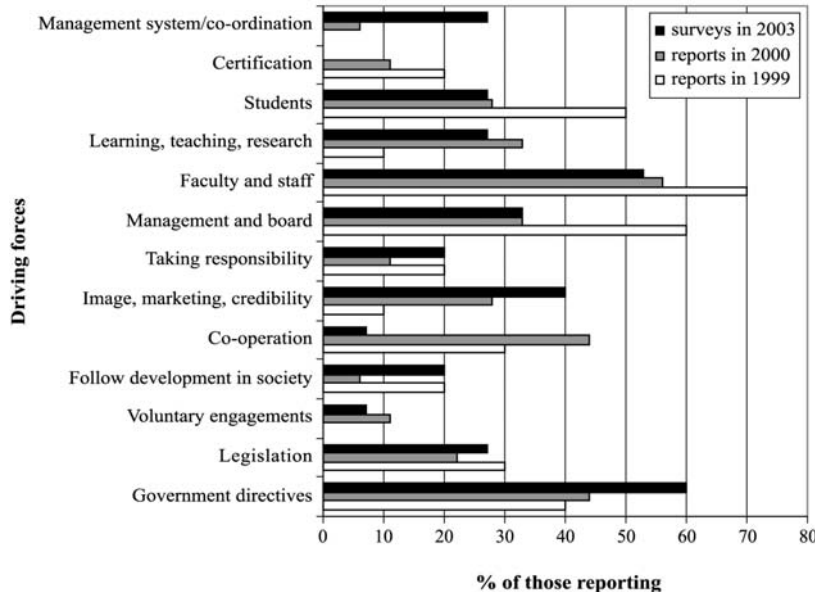


Figure 1. Driving forces as reported by universities (Annual environmental reports for Swedish universities, 1999 – 2000) and in a survey with environmental co-ordinators in March, 2003.

Note: Driving forces of all categories were not reported every year

In 1999 and 2000, most universities (10/13 and 18/24, respectively) reported driving forces in their work for environmental management:

- Internal driving forces such as interest and engagement from faculty and staff, management and board, and students were the three most frequently reported driving forces in 1999. The students include those studying at present, as well as possible future ones.
- Engagement from the faculty and staff was the most important internal driving force in 2000 whereas the external driving forces of government directives and co-operation were the other two. Co-operation partners indicated were often local initiatives with the community, landlord, or regional and national networks.
- In 2003, the external driving forces most frequently mentioned were government directives and the external reputation such as image, good will and credibility. Faculty and staff was the most important internal driving force. Some comments indicated the importance of having someone responsible, who is engaged and promoting the issue.

Some differences between the years are:

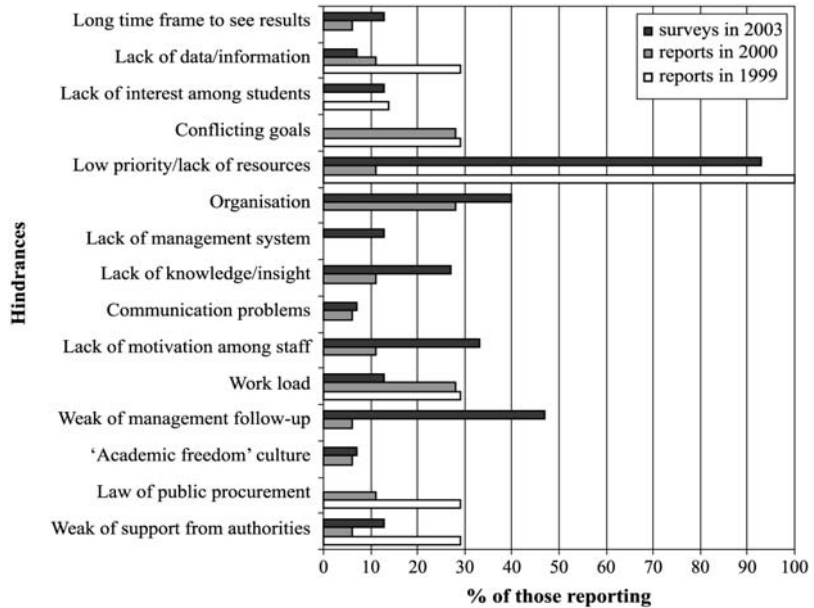
- The most frequently noted driving forces in 1999 were all internal, whereas in 2000 and 2003 two of the three most frequently reported driving forces were external.
- The role of management and board, faculty and staff, and students as driving forces appear to be reduced. However, faculty and staff still remain one of the most common internal driving forces in EM work at universities.
- Certification as a driving force has been replaced by structural and co-ordination gains of quality and health and safety management systems.

Hindrances

The hindrances reported by the universities in their annual reports for 1999 and 2000 and a survey among environmental co-ordinators in March 2003 are recorded in Figure 2.

In 1999 and 2000 most universities, 7/13 and 18/24 respectively, reported hindrances in their work for environmental management:

- Only 54 per cent of respondents noted hindrances, but all these pointed to priority/resources for the issue as a hindrance. The other hindrances were recorded only in less than one-third of the reports.
- In 2000, no hindrance was recorded in more than 28 per cent of the annual environmental reports.
- In the survey of 2003, the main hindrance again was low priority/lack of resources. Weak management engagement and organisation were recorded in 47 per cent and 40 per cent, respectively, of the reports. Lack of clarity, due to extensive decentralisation, scattered organisation and bureaucracy, as well as lack of or not using the environmental organisation at the university were indicated as reasons.



Note: Hindrances of all categories were not reported every year

Figure 2. Hindrances as reported by universities (Annual environmental reports for Swedish universities for 1999 – 2000) and in a survey with environmental co-ordinators in March, 2003

Some observations

- Fewer universities reported a smaller number of hindrances than driving forces in 1999 and 2000. In the survey, they were specifically asked to report both.
- It is interesting to note that in 2000 only few reports included lack of priority/resources as a hindrance. The fact that the low priority/lack of resources was not reported as a hindrance appears surprising. The reason for this is not known, but it could be, for example, due to some extra resources committed to the project in the universities that year.
- The management engagement/support as a driving force from 1999 appears to have turned into weakness/lack of follow up in 2003, which was mentioned as a hindrance.

Environmental aspects

Indirect environmental aspects could be expected to get a prominent place in public agencies. In higher education the indirect environmental aspects come from:

- the education of students;
- research; and
- contacts with surrounding society.

For example, the basic task assigned for universities according to the Swedish Higher Education Act (SFS, 1992, p. 1,434). The directives to 30 of the universities also focus especially on their indirect aspects (Miljödepartementet, 1996, 1997, 1998, 1999, 2001b). It is acknowledged, however, that the indirect aspects are difficult to evaluate in quantitative terms, since the environmental impact cannot be confined to a short period of time or a limited space.

Since most universities have submitted their initial environmental reviews earlier, only a few of them provide detailed information about how the environmental aspects were prioritised and by whom this was done in their environmental annual reports for 2002.

The environmental aspects reported by the 19 universities that appear to have prioritised them are presented in Figure 3.

Out of the 19 universities that prioritised their environmental aspects, 15 consider education as one of their significant environmental aspects. One university, which has been part of the project for three years, concluded that there were indirect environmental aspects worth considering for the first time in 2002. Four universities do not mention indirect environmental aspects at all.

The other two basic tasks for universities, research and contacts with the surrounding society, were considered significant by 10 and 2 universities respectively, corresponding to 53 per cent and 11 per cent, respectively. This can be compared to the fact that 17 consider travelling and 15 energy usage as significant environmental aspects, corresponding to 89 per cent and 79 per cent, respectively.

Out of the 15 universities that consider education as an important environmental aspect five universities reported about any concrete action taken during 2002 (Arvidsson, 2003). This means that in addition to regular courses they have done

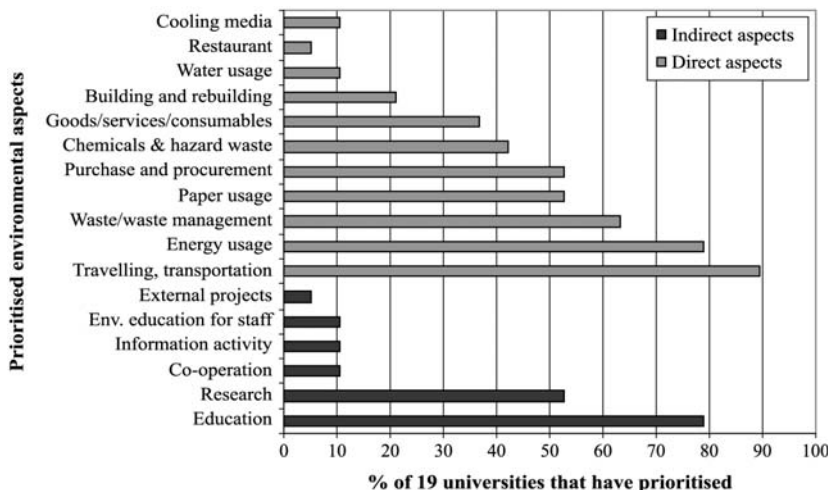


Figure 3. The reported significant environmental aspects that the 19 universities appear to have prioritised

Note: Five of them report concrete action taken concerning indirect environmental aspects

something concerning the environment in a wider perspective, such as sustainable development and the universities three main tasks.

The results of the EMS work are summarised in Figure 4.

It can be observed that a number of universities have created an environmental policy, and some have defined environmental targets without prioritising their environmental aspects first. Only few universities have performed environmental audits.

The environmental co-ordinator

In the annual environmental reports only limited information is provided about the environmental organisation of the universities, but some further information was available on the internet home pages.

The position of the environmental co-ordinator in the university organisation follows three main patterns:

- (1) A total of eight universities have a person with a clearly stated environmental function placed in the service, construction or maintenance departments with titles like environmental manager, environmental and safety manager/representative, head of department or environmental co-ordinator.
- (2) There is a person in a full-time or part-time administrative function in the president's office at eight universities. They have such job titles as environmental manager, dean for environmental management, environmental co-ordinator, environmental secretary or project leader.
- (3) Eight universities have people with other functions in the organisation.

There were eight universities that did not provide any information about their environmental co-ordinator and two stated that they had no environmental organisation at work then, as the project had been laid down.

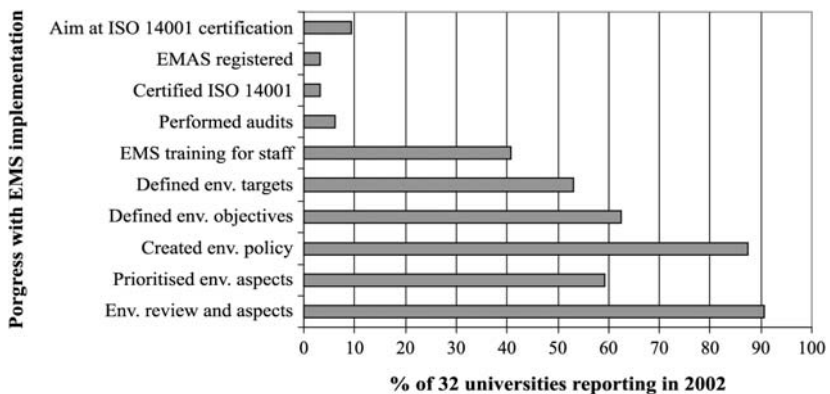


Figure 4.
The progress so far with
EMS implementation in
Swedish universities

Source: Modified from Arvidsson (2003)

Discussion

Driving forces and hindrances

Most universities have reported driving forces when they have been requested, but the interest in reporting hindrances has been somewhat smaller.

Initially, all the driving forces appeared all to be internal and, although the importance of the faculty and staff has remained about the same, the importance of government directives, an external driving force, has increased. Based on the material in this study, it is not possible to say what the reasons are. It is possible, however, to presume that a long commitment from staff, faculty and management which is needed for an EMS implementation, has not been there and lack of management engagement and follow-up has become an important internal hindrance which results in low priority and lack of resources. Environmental reporting is separate from the regular annual reporting and no sanctions are indicated in the directives for not reporting. This could reduce the motivation and makes it more difficult for the university management to prioritise the issue and to integrate it into regular activities.

The role of the students has been reduced, which coincides with the declined numbers of students registering into "environmental programs" (VHS, 2003). Even a few engaged students can be a very strong driving force, but the interest between student generations varies, and most students engage beyond their studies only during part of their total study time.

Industrial companies often have direct environmental aspects on chemicals and environmental hazards. Legal requirements concerning these direct environmental aspects and competition are strong driving forces. In universities, where indirect environmental aspects, which cannot be limited into a short time and limited space dominate, it is more difficult to make the benefits of EMS tangible. There have, for example, been explosions in university labs (*Göteborgs Posten*, 2001), but these minor incidents attract mainly local interest. Universities are, however, becoming more aware of their image toward the world outside since the preconditions of their existence are rapidly changing and the competition for students is becoming global. Some universities see a certified EMS as part of a university's image in attracting environmentally engaged students.

In their comments in the annual reports and the survey, some universities provide additional information as to the reasons for the work with EMS and also possible certification of the system.

Research financiers are expected to start making requirements concerning environmental responsibility a precondition of their financing. Even now, the Swedish Environmental Protection Agency wants the applicants for research funding to submit documentation of their active environmental work (SNV, 2002).

Even though the Government does not require the universities to get their EMS certified, there are those which have been or aim at being certified according to ISO 14001. Motives for this are, apart from image creation, internal. Some universities indicated that an EMS would be the first clearly structured management system at the university.

One of the hindrances that some universities mentioned initially was to get data to make a follow-up possible. The work with EMS has created structures for this and some universities are also starting to experience savings due to reduced waste handling costs, etc. This is also a trend that can be expected to continue due to the more

constrained economy in the universities and the expected stricter legislation regarding, for example, waste generation and higher energy cost in the future.

Environmental aspects

Universities are increasingly focusing on education, research and contacts with the surrounding society as their most significant environmental aspects. This is due to the number of students and research results by which the universities have a long-term environmental impact even though no exact figures can be obtained. But the universities can measure the continuous improvement in the methods in which they try to stimulate students' learning, for example, by providing environmental courses for all students and increasing the environmental moments in regular disciplinary courses. The students would then later be better equipped in their professions to contribute to sustainable development.

The direct environmental aspects are easier to identify and quantify, and all universities have included one or several of them in their list of aspects.

Some universities, however, do not use a systematic approach of an EMS like ISO 14001. The reason for mapping all possible environmental aspects and then prioritising them is to enable focusing on reducing the most negative environmental impact. If the lack of evaluation through audits and revision of objectives and targets to gain continuous improvement is due to lack of structure or to the fact that they have not reached the stage yet, remains to be seen.

Environmental co-ordinators

In the universities a corporate environmental staff, which is common in many industrial organisations, is replaced by the environmental co-ordinator, and possibly an environmental council or group with representatives from different parts of the university. The Swedish Environmental Protection Agency has provided training and guidance concerning environmental issues and the EMS process since 1997, but it has taken time to build up the competence, while at the same time trying to implement the system at the different universities.

The collegial decision-making structure (Ramsden, 1998) and the question of responsibility is somewhat unclear in academic organisations and an EMS implementation can actualise the importance of someone responsible in management position as was indicated in some comments. One of the main driving forces mentioned in the survey in 2003, which could indicate that the question of responsibility had not been quite clear previously.

Once it became apparent that the task was more complicated and would take a longer commitment, some universities have made a restart, often with a new environmental co-ordinator. This can be seen when following the work in the annual environmental reports 1997-2002. With the new start, the environmental co-ordinator is often placed in the president's office. This can be seen as an indication of more importance in a function that serves the whole university from a management perspective. An example of this is the university holding an EMAS-registration for a small unit. The environmental co-ordinator was earlier placed in the maintenance department but in 2002 she was moved to the president's office. According to her this has strengthened the environmental profile at the university.

Although the role of the university president in an EMS implementation has not been studied yet, both literature and empirical studies indicate that a management systems implementation requires “real management engagement” (Rikhardsson and Welford, 1997). In universities, the president represents the top management, but due to the special characteristics of institutions of higher education, with, for example, a strong collegial decision-making structure, the president does not have the same executive power as a CEO would in a business company. But the president has a strong symbolic function and her/his commitment can be equally valuable by demonstrating for those inside and outside the organisation how prioritised the issue is.

Conclusions

As stated at the beginning, the aim of this paper is to increase the understanding of how environmental management systems are being implemented in Swedish universities by studying the acceptance through driving forces and hindrances for the work, the focus through environmental aspects that have been prioritised and environmental co-ordinators' placement in the organisation. The conclusions of the study are the following:

- The government initiative, launched on a broad front, which is the directive to implement environmental management systems, was giving results in most of the 35 universities in 2002. Three of them did not submit an annual environmental report for the year and two of the universities indicated on their home pages that the project had been laid down.
- For the driving forces, internal ones of the early years are being replaced by external ones, where the government directive plays a significant role. The initial management engagement, which was a driving force, has turned into a hindrance due to the lack of interest and follow-up. In the future requirements from research financiers are likely to become an important external driving force.
- Although universities, over time, are placing more emphasis on the indirect environmental aspects in education, research and contacts with the surrounding society, very few are taking a concrete action.
- Not all the universities are following the structure for a standardised EMS like ISO 14001. This is shown in the fact that many universities have not prioritised their environmental aspects. Many of them have also established environmental objectives and targets and environmental policies, but have never evaluated them.
- In the universities that have been involved longer in the project, the environmental co-ordinator has a more clear position and information in the annual environmental report is generally more readily available. It is also apparent that an existing certification or certification as a goal increases the likelihood of the environmental co-ordinator being placed in the president's office.

By its directive the government made a tool that is voluntary in industry a compulsory one in the public sector. But the work with EMS in Swedish universities is proceeding even though the environmental management system represents a concept that is new in academia. There are some problems in working with the management system

structure and most universities have not performed audits or revised their targets and objectives.

The picture that has emerged in this study is the one seen from the perspective of the environmental co-ordinator for most of the Swedish universities. The environmental co-ordinators are the ones who could be expected to have the most complete overview of the environmental work at their universities, but it can be biased both when it comes to highlighting the positive achievements and the problems they experience. In practice, they compile and co-sign the environmental reports although the president is the official authority signing the document. The results from the annual reports can therefore be compared with the survey made among environmental co-ordinators.

In spite of the limitations in the perspective and scope of the study, it provides a basic platform for further studies of environmental management in Swedish universities and for identifying ways of improving the process.

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Paper II

Sammalisto, K. (2004). *From Government Directive to sustainable development in Swedish universities*. Conference paper presented at the EMSU conference in Monterrey, Mexico, June 9-11, 2004. With minor editorial revisions made in June 2007.

From Government Directive to Sustainable Development in Swedish Universities

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Abstract

The Swedish Government appointed the public sector to be a role model in the work for sustainable development in the society and has, since 1996, given public agencies, including 35 universities directives to implement environmental management systems. This paper follows the progress of the universities based on their annual environmental reports for 2003 with some comparisons made to studies for 2000 and 2002.

The study indicates that there is progress in the environmental management systems process. More than 60% of the universities have made environmental reviews, created environmental policies and defined objectives and targets. Faculty, staff and management are going through environmental training and universities are reaching the stage of having revisions of their environmental management systems, but only a few universities are aiming at an ISO 14001 certification.

As universities work with their indirect environmental aspects in education and direct environmental aspects in campus management, they are likely to have an impact on the lives of their students. Although the focus initially is on environment, it is easy to connect to the wider sustainability perspective in discussing issues with the students and thus promote sustainable development.

Background

The stress on the natural environment that results in climate change, toxins in the ecosystem and other problems has increased the awareness of a need of

sustainable development globally. One of the most important measures is education, the role of which has been focused on in the Earth Summit in Johannesburg in 2002 and by the fact that the United Nations have declared the years of 2005-2014 as the United Nations Decade of Education for Sustainable Development (United Nations, 2002; MOFA, 2003). This has also been the focus of the Ministers of Education in the Baltic countries when they adopted Agenda 21 for the Baltic region (Baltic 21, 2002).

Thirty-five universities of the more than 200 Swedish public authorities have received a Government Directive to start implementing environmental management systems (EMS) since 1997 (Miljödepartementet, 1997). This is based on the government decision that public authorities should be role models in contributing to the long-term sustainable development in society (SOU 1996:112). There is no requirement of the certification of the environmental management systems, but they should include an environmental review, prioritisation of environmental aspects, stating objectives and targets, and performing audits. Environmental reports are to be submitted annually to the Swedish Environmental Protection Agency and the Ministry that is responsible for the agency in question, which is the Ministry of Education for the universities.

The EMS process for all public agencies has been followed up in a report by the Swedish Environmental Protection Agency (SNV, 2004). The progress of the EMS implementation in Swedish universities for the years 2000 and 2002 has been examined in earlier publications (Arvidsson, 2002; Arvidsson 2003). A wider study of how and why universities are working with EMS is presented in an article for the period of 1997-2002 (Sammalisto & Arvidsson, 2005). It is based on an empirical study of the Government Directives of 1996-2002, annual environmental reports from the universities of 1999-2002 and on a survey in 2003. This wider study indicates that the universities are mainly focusing on the direct environmental aspects like paper use and waste handling rather than on their main processes of education, research and co-operation with the surrounding society as a source of their main environmental impact. Little concrete action is taken as regards the indirect environmental aspects. The Government Directives are taking over the role of the internal driving forces for the process. The initial engagement that the university management demonstrated has turned into a hindrance due to the lack of interest and follow-up. Not all universities follow the standardised EMS cycle according to ISO 14001 (SIS, 1996).

Aim

The aim of this empirical study is to continue following the EMS progress in Swedish universities based on their environmental reports for the year 2003 in order to find out how universities work with the EMS implementation and how the work is proceeding. A comparison will be made to summaries of the progress from 2000 and 2002.

Method

EMS implementation in universities can be characterised by the following over-

lapping steps of change (Sammalisto & Arvidsson, 2004):

1. Government directive
2. EMS implementation in higher education
3. Awareness among faculty and staff
4. Greening of courses/research/campus management
5. Knowledge/awareness/student competence among the students
6. Decisions/actions for sustainable development
7. A more sustainable society

The long time frame and scope of the results makes it impossible to measure the results the longer down the chain we get. The effort can, however, be assessed via the greening of the courses, research and campus management, i.e. elements in an environmental management system at a university. This study continues to focus mainly on the second stage of the process.

The universities among other public agencies were asked to answer to following questions in the reporting guidelines (Miljödepartementet, 2003):

- If and when was an environmental initial review performed? If and when has it been reviewed?
- What are the significant environmental aspects?
- Is there an environmental policy? If and when has it been reviewed?
- What are the environmental objectives and targets?
- How have the targets been reached through what activities? and
- Are the targets integrated in the operational plan?
- Have they provided the management or other groups of faculty and staff with any environmental training during the year and how many attended? What was the focus on the training?

- If and when were internal and external audits performed?
- How much and what type of environmental integration is there in procurement and purchasing?
- Is the authority certified or registered according to ISO 14001/EMAS?
- Does the authority aim at certification or registration?
- Are there any positive changes noted due to the EMS during the year?

An analysis of the environmental reports provides answers to these questions. Of the 35 universities with the directive to implement environmental management system, 32 submitted an annual environmental report for the year 2003.

Prioritisation of environmental aspects as well as the work with objectives, targets and audits indicate how the university is following the structured EMS cycle according to ISO 14001. Although this 'how'-aspect has been studied previously, a review is being made on the changes that have taken place since 2002. Has there been any change in what environmental aspects, as defined in Miljödepartementet (2000), the universities have prioritised, i.e. what do they perceive to be the most significant environmental impact they need to focus on?

All the environmental aspects were listed and clustered to correspond to the previous study (Sammalisto & Arvidsson, 2004). The terminology used in describing environmental aspects from the different universities was rather coherent. For example, chemicals and hazardous waste also include laboratory activity, and energy use includes electricity, heating and cooling of the buildings.

The environmental objectives and targets are defined to reduce the university's main environmental impact, corresponding to significant environ-

mental aspects. They help to focus on the efforts and make it possible to follow how the work is going. The results from the universities with only one type of environmental goals without separate objectives and targets were analysed along with targets since they appear to be followed up in the same way. The results from the university with only activities that are followed up were also included in this group. The reporting was to be presented in a table with both the degree to which the target has been reached (to 100%, more than 50%, to 50%, less than 50% and was not at all) and how the result has been evaluated (by indicator, survey, estimate or other).

As a requested way to reduce the environmental impact, the government asked the authorities to make environmental requirements in their procurement (Miljödepartementet, 2001). The annual reports for 2003 provide some information about this, although there was some unclarity in the formulation of the questions concerning procurement and purchasing. This resulted in two different sets of instructions about the reporting. One asked for the percentage of purchases based on framework agreements from other public authorities or the number of framework agreements that the authority had applied, and the other asked for the percentage of their own purchases through framework agreements where environmental requirements were made. This resulted in data either in percentages or numbers, which does not allow creating a detailed total picture. Information was also requested about the types of environmental requirements and some examples of environmental requirements in procurement. The answers to these also vary to a great extent; therefore only examples of environmental requirements, which 24 of the 32 universities supplied, are summarised in this paper.

In this paper answers to the issues above will be provided first based on the annual environmental reports together with an overall view of the EMS process in Swedish universities with a comparison to 2000 and 2002 based on previous reports. Some experiences reported by the universities and a discussion of the process with final conclusions will be included in the end.

Results

Environmental aspects

The main processes of the Swedish universities as specified by the Higher Education Act are education, research and co-operation with the surrounding society. They could thus be expected to cause some of the main environmental impact for universities. Eight out of 32 reporting universities have not recorded any indirect environmental aspects, one has only started the work by adopting an environmental policy, and one has included the information in an earlier

report and has excluded it from the report for 2003.

The changes as regards prioritised aspects since 2002 derive from the fact that five of the universities report having revised their prioritisations last year and a total of 27 universities appear to have prioritised their aspects as opposed to 19 in 2002 (cf. Diagram 1). One university has had a revision of all its aspects, three universities have revised their indirect aspects, and one has made a new initial environmental review.

It is interesting to note that although the changes are small, the reporting of indirect environmental aspects regarding education appears to have been somewhat reduced, from 79% to 74%. This is interesting especially in the light of the fact that three universes have revised their environmental reviews including those on their lists. Research, co-operation and EMS training for staff remain the same whereas management and organisation are on the list of significant aspects of university.

Diagram 1: Prioritised environmental aspects as reported by 19 universities in 2002 (Sammalisto & Arvidsson, 2004) and by 27 universities in 2003.

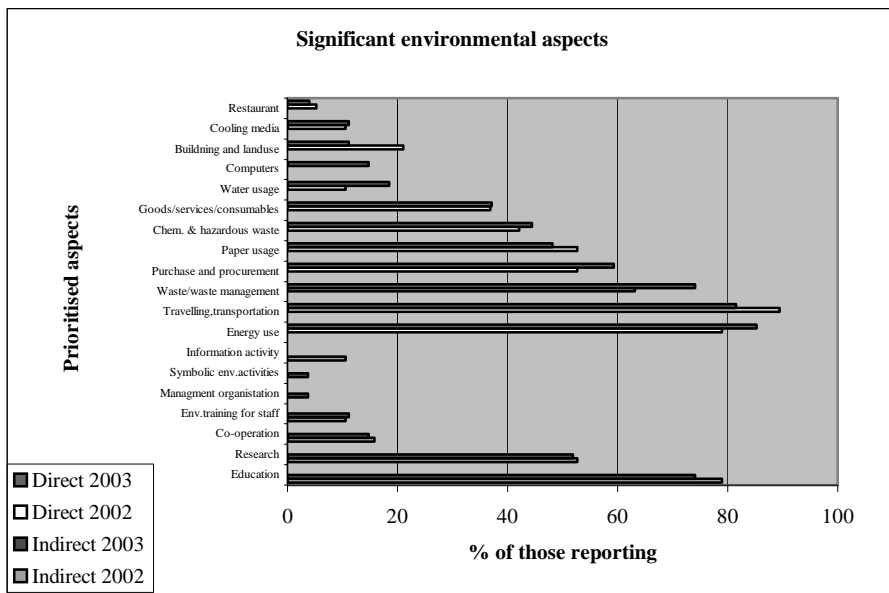
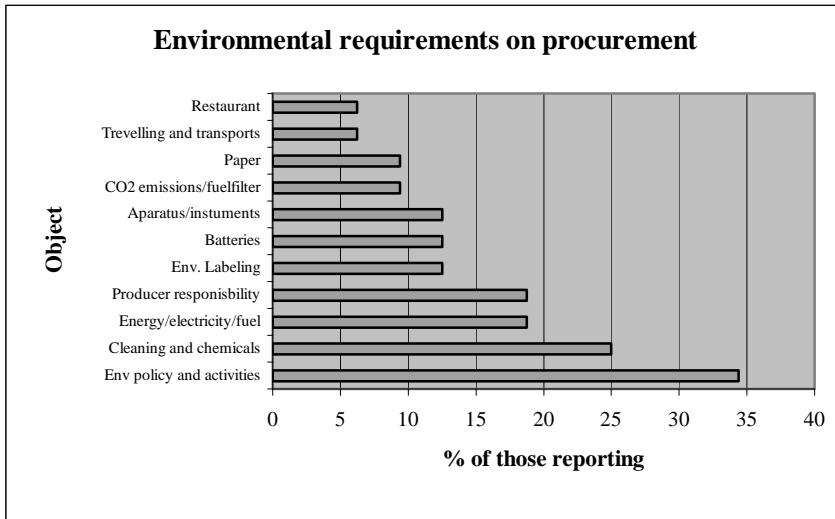


Diagram 2: Objects on which Swedish universities report environmental requirements in procurement in 2003.



Of the direct environmental aspects energy use and transportation and travel continue to dominate. Waste management is reported among the most significant environmental aspects as often as education, and more universities than a year ago report it. Purchase and procurement, computer-use and water usage have also increased in reporting frequency, while building and land-use have been reduced.

Procurement

In the Government Directives the universities and all public agencies have been asked “to report the environmental adjustments of their procurement” (Miljödepartementet, 2001). In the annual environmental reports of 2003, 34% of the universities stated that they did not have any data regarding to what extent the adjustment had been made. In 13% of them the reason for this is decentralisation of procurement activities.

It is not possible to make any conclusions for the data of how many percent of the procurement is made on framework agreements from other autho-

rities since three of those that answered reported the number of purchases (15, 20 and 26) while others stated percentages ranging from 17% to 95%.

Only two universities provided an answer as to the number and two more as to the percentage of their own framework agreements, which makes it impossible to draw any conclusions. Seventeen universities provided data on how many of their own purchases were environmentally adjusted. Two of them gave a figure without providing information about how much this is of their total purchases. Environmental adjustment in procurement of the remaining 15 universities varies from 1% to 100%.

The universities were also asked to give examples on the objects on which they have environmental requirements in procurement (cf. Diagram 2). The most frequent requirements are the suppliers’ environmental policy or other environmental activities. This is done by 34% of the universities. Cleaning services and chemicals have environmental requirements in 25% of the universities while energy and producer responsibility are

requirements for 19% universities and environmental labelling, batteries and apparatus and instruments 13% each.

Reaching environmental targets

Environmental objectives and targets were reported by 22 out of the 32 universities, but these do not entirely coincide. Two universities have not reached the stage of having environmental targets and 5 other universities have only one type of environmental goals, not differentiating between objectives and targets. Such objectives are here included in the targets since they are reported with actions and have been followed and evaluated among them. The same applies to the results from the university that has neither objectives nor targets, but a number of actions deriving directly from an environmental policy that has been followed up and evaluated.

A total of 135 various objectives were reported by the 22 universities. The average number of objectives is six, ranging from one to 13. The total number of targets, or activities, that were followed by 22 universities was 258, making the average 11 ranging from two to 42 per university (cf. Diagram 3).

The larger universities have a greater number of both objectives and targets than the smaller ones. 37% of the targets were reached at 100%, a total at 34% to at least 50% and a total of 28% to less than a half or not at all. The main method of

measurement is estimates, followed by 'other', indicators and surveys. Only 19% of the measurements are based on indicators. There is no indication of what 'other' methods might include. It can also be noted that many of the targets are not measurable due to their evaluation or systems development character.

Progress

It is apparent that there is progress in the EMS process in the universities as summarised in Diagram 4. The number of universities that have made an initial environmental review has increased from 84 to 94% since 2000. Those that appear to have prioritised their environmental aspects in 2003 have increased from 59% to 81% compared to the year before. 16% of the universities have revised their environmental aspects as stated earlier.

The number of universities that have an environmental policy has increased from 76% to 97% since 2000, 9% of which also report having revised their environmental policy in 2003. One of the universities reporting for 2003 still does not have an environmental policy while another has taken a policy without an initial environmental review.

The number of the universities that have objectives and targets is now 69%, an increase by about 30%-units since 2000. But as previously stated not all of them coincide in 2003.

Diagram 3: Degree of target reaching and how it was measured.

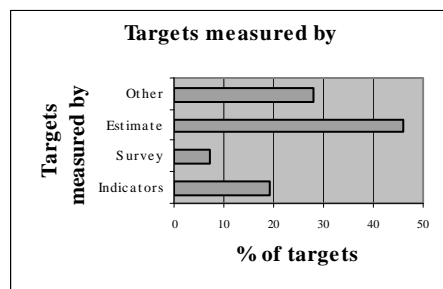
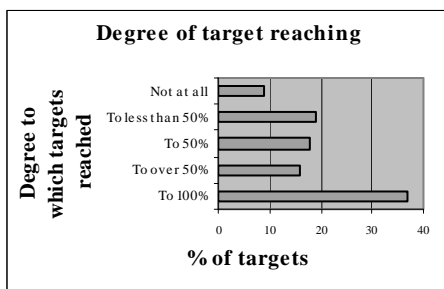
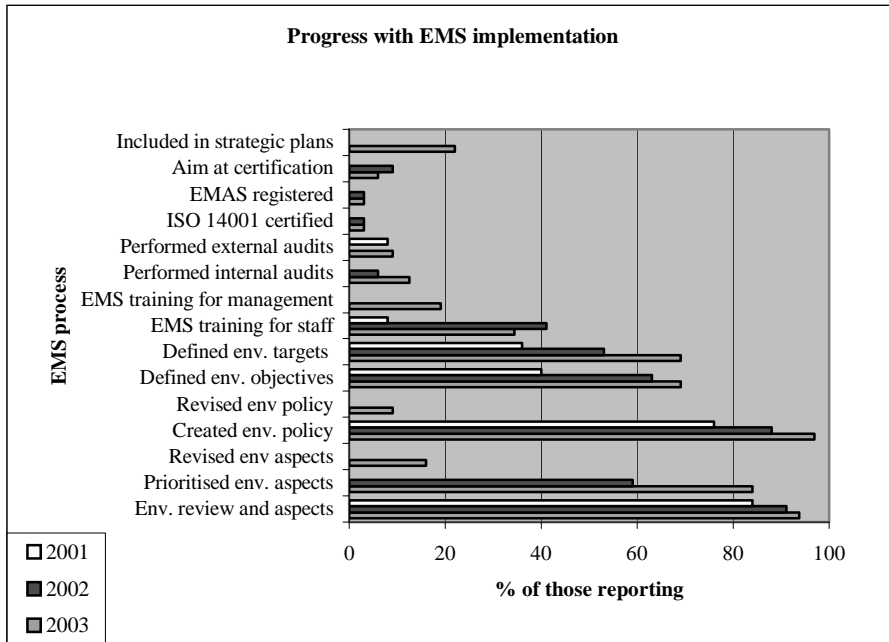


Diagram 4: The EMS progress in Swedish universities in 2000 (SNV 2002), 2002 (Sammalisto & Arvidsson, 2005) and 2003.



In 2002 a lot of focus was placed on staff training; it increased from 8% to 41%, but was again reduced to 34% a year later. In 2003 environmental training was provided for the management in 19% of universities, but no data was summarised for the earlier years. It is interesting to note that while environmental training for faculty and staff has increased as a prioritised environmental aspect in 2003, somewhat less training is reported in practice. Only few universities provide information about the content of the environmental training. The main focus appears to lie on basic environmental training and the environmental management system of their university. The more specific issues include paper and waste management, energy and environmental legislation.

Environmental audits have also started in some universities. 13% report that internal and 9% that external audits

have been performed at the universities in 2003. The number of internal audits has doubled since 2000, but the external ones remain unchanged, probably due to the constant number of ISO 14001 certified and EMAS registered universities. One university was ISO 14001 certified in 2003. The EMAS registered department of the only university with EMAS registration was laid down, so their EMAS registration is now recumbent. While there were three universities aiming at certification in 2002 the number has been reduced to two, one of which gained a partial certification in early 2004.

One of the objectives in the directives was to integrate the environmental work within the operational plans of the public agencies (Miljödepartementet, 2001). 22% of the universities report that this applies to them in 2003. This can be done for example by including in the budget a directive that resources for environmental

work must be made available by every department.

Some experiences from universities

In their annual environmental reports many universities report assessing their courses, educational and research programs and theses on different levels for elements of environmental and sustainability issues. They are also developing tools to increase the 'greening' content in education. One university is planning to provide students with a possibility of having a cross-disciplinary minor subject and another to introduce a new discipline, 'sustainability science'. A science festival and a national competition on Environmental innovation are examples of efforts to reach a wider audience.

Many universities are included in local and regional co-operation and networks to better deal with various issues like registering chemicals, waste handling and energy saving. Actions like the 'Carless city' to reduce transportation and 'Stop the unnecessary' to reduce use of energy are results of these networks. Especially concerning energy efficiency in heating and cooling many universities are co-operating with their landlords and making 'night walks' to check unnecessary lights and computers that have been left on. New premises are being environmentally adjusted from the beginning.

Fuel filters are required on security vehicles, rented cars to be driven by ethanol or biogas, and bicycles are being bought for local transportation. Two universities also report of car pools being used. Many universities have gone over to double-sided copying and printing to reduce use of paper and the University of Opera is requesting students to have their own music instead of copying them from others.

Many universities report on clarification of the environmental responsibility of the university and benefits of introducing a more structured way of

working. The benefits are increasing awareness of environmental impact, environmental legislation that must be followed and other areas of potential improvement. Some universities are also working on coordinating environmental management with health and safety, or quality issues of their universities and use the possibilities of simultaneous reporting of the different issues. There are some conflicts between these areas for example in that reduced lighting or ventilation, which are positive for the environment, can be negative for the working environment.

Two universities are using a form of environmental diploma, which is a point gathering system for routines connected to direct environmental aspects on a small scale to get the work started within the organisation.

The ISO 14001 certified university reports that their EMS is working so well that the audit intervals have been lengthened from 6 to 9 months.

Six universities report of a restart of the EMS process with a new environmental coordinator and more resources and many universities are planning revisions and audits to keep the system up-to-date. All universities report positive changes that aim at reducing their environmental impact in the long run. Most of them also include the indirect environmental impact. It is interesting to see the progress that is being made, but some universities express that clear goals and more follow-up from the Government would help to keep the process going and to keep the focus on the future. Lack of measurable data for indicators of follow-up targets in many areas is also a problem.

Discussion and Conclusions

Although most universities are following the logic of a standardised EMS process there are some that do not follow it. One university, for example, has education in

its environmental policy and targets, but not in the objectives or activities. The prioritisation of the environmental aspects is missing in some cases and the terminology also appears to create problems, for example, making a difference between objectives, targets and activities. It is possible, however, to work with environmental issues outside the structure of EMS and make progress.

This paper is based on the data from the annual reports for 2003 and summaries of earlier years. These summaries do not include all concrete activities that have been made earlier and cannot therefore be made visible. It is also impossible to report all the different activities for sustainable development that take place in all different parts of a university.

Progress can be seen in the EMS process in Swedish universities and it can be assumed to a large extent result to from the Government Directive and its reporting requirements although they are not enforced. It is highly unlikely that many universities should have started working within the structured EMS frame with all its requirements without the press from the directive. It is not likely that the changes should have been integrated in the whole organisation in most universities. This requires further study.

Mainstreaming of environmental management can be considered normal in the long run; initially, it is important to have special focus on environmental and sustainability issues to gain attention. Although the main focus in an environmental management system is on environment, the system implementation, it will inevitably increase awareness via the academic 'methods' of debate and discussion. In this way it can be a tool in promoting sustainability in higher education and in the long run in creating a more sustainable society through students.

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Annual environmental reports for 2003 for the following universities

Uppsala University
Lund University

Göteborg University
Stockholm University
Umeå University
Linköping University
Karolinska Institutet
Royal Institute of Technology
Luleå University of Technology
Karlstad University
Växjö University
Örebro University
Blekinge Institute of Technology
Kalmar University
Malmö University
Mid Sweden University
Mälardalen University
University of Borås
Dalarna University
Gotland University
University of Gävle
Halmstad University
Kristianstad University
University of Skövde
University of Trollhättan/ Uddevalla
Stockholm University of Physical Education and Sports
Stockholm Institute of Education
Södertörn University
University of Dance
University College of Film, Radio, Television and Theatre (Dramatiska institutet)
University of Arts Craft and Design
Royal University of fine Arts
The Royal University of Music in Stockholm
University of Opera
University of Acting in Stockholm

Paper III

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Training and communication in the implementation of environmental management systems (ISO 14001): a case study at the University of Gävle, Sweden

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Abstract

Training and communication are essential elements in the implementation of environmental management systems (EMS). This study is based on two main questions: (i) What methods for training and communication will support the implementation of EMS at a university? and, (ii) How did faculty and staff perceive the training and communication activities? The study includes a literature review, a case study of methods for training and communication, and results of a semi quantitative survey of the perception of training and communication. All activities took place at the University of Gävle (Sweden). The University of Gävle was certified according to ISO 14001 in 2004. Practical experiences from the implementation of EMS in industry were used as reference.

The literature review indicates that training is a key factor during implementation of EMS, and that training may change attitude and behaviour among managers and employees. Similar conclusions can be drawn from this study. The case study, and practical experiences from industry, indicate that similar methods of EMS training and communication can be shared by industry and universities. However, “academic freedom” and “critical thinking” may result in the need for more interactive training methods at a university than in industry. The results of the survey indicate that the training and communication have increased awareness of environmental issues. A deeper understanding of the personal role in the EMS was also observed. It can be concluded that the EMS training and communication team has a demanding task to introduce the concept of indirect environmental aspects at a university. Lecturers and researchers should be convinced that the greening of a college involves more than, for example, reducing the consumption of paper. The main role of EMS at a university should be to focus on indirect environmental aspects, for example, to introduce environmental and sustainability issues in courses and research.

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Keywords: Environmental management; University; Training; Communication; Awareness; Sustainable development

1. Background

1.1. Swedish governmental EMS directive

As a step to support sustainable development in society, the Swedish Government has since 1996 issued Directives addressed to public agencies requiring the implementation of

environmental management systems (EMS). The Directives declare that public agencies should implement the core elements of the EMS, such as identification of significant environmental aspects and establishment of environmental policy and objectives. ISO 14001 was recommended as a template but the Directives did not require third party certification of the EMS. By the end of 2005 fourteen out of 240 Swedish public agencies had achieved ISO 14001 certification and/or EMAS registration. For different reasons most of the public agencies have, so far, chosen not to apply for the official certificate. Currently they “self-declare” the EMS status in their

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annual environmental management reports to the Swedish Government. However, there is a growing interest in EMS within the public sector and of roughly 3700 ISO certified Swedish organisations there are an increasing number of municipalities, hospitals and other public organisations. According to the Directives, the systematic approach to environmental issues may later on be expanded to also include other aspects of sustainability, i.e. social, ethical and economic issues [1,2]. EMS at Swedish universities and other public agencies can, in this context, be seen as an example of an important tool in the aims for a sustainable society [3]. Fig. 1 shows the role of a university, or other institution for higher education, in this process.

In two previously published studies the experiences of steps 1 and 2 are reported [4,5]. This study is focussed on step 3 at the University of Gävle in Sweden. The study describes methods for training and communication in the implementation of EMS and the perception of such activities. Step 4 will be analysed in a coming study.

1.2. Roles of training and communication in EMS

The current number of ISO 14001 certificates that have been issued globally is over 100,000 [6]. Many of the ISO 14001 certificates and experiences are found in industrial settings. Practical experiences and a number of studies show that commitment from managers and employees is essential during implementation and maintenance of the EMS [7–10]. It is rather common that organisations try to utilise existing resources within the frame of a limited budget to provide training and communication. Some companies, however, spend a substantial amount of time and resources on education and information. For example, in one global company with about 100 sites, the number of hours per employee per year allocated to environmental, health and safety training was on average around 4.0 [11]. In this same company, during 1998–2004, 86 sites were certified according to ISO 14001. Company statistics showed that during the implementation of ISO 14001, the training hours increased by a factor of 2 to 5 at many of the individual sites. As a result of the training, site managers often reported positive effects from ISO 14001, for example, increased awareness and improved environmental performance [11].

Typical elements of the general training for employees include environmental policy, environmental aspects, company procedures, instructions and non-conformity reporting [12–14]. Employees that have key roles for influencing environmental impacts and the organisation's EMS receive more detailed

training. The training and communication serve at least two purposes: to teach people about company policies and everyday procedures, but also to change the attitudes of individuals and create increased awareness about environmental issues [13,15–17]. A similar approach could be used during implementation of ISO 14001 at a university or other public agency. The strong emphasis ISO 14001 places on training and communication as a means of realising changes and continuous improvement can be found in paragraphs 4.4.2 and 4.4.3 [18].

As indicated above, there are a number of published case studies concerning the implementation of ISO 14001 in industrial companies. Some overviews describing the application of environmental management systems at university settings are also available [19–24]. However, methods and perceptions of environmental training and communication in association with implementation of EMS, in industry and universities, are discussed very little in the literature. The following quote concerning occupational health and safety can serve as a starting point for this study: "Various laws and regulations require the dissemination of occupational health and safety information but little is known of the effectiveness of such efforts" [25].

1.3. Objective of the study

The knowledge about implementation and certification of EMS (ISO 14001) at universities is rather limited. The overall objective of this paper is to focus on the role of training and communication in the implementation of an EMS. The perception and effectiveness of the training is also addressed. The study is based on two main questions:

- What methods for training and communication will support the implementation of EMS at a university?
- How did faculty and staff perceive the training and communication activities?

2. Methods

The study is based on the following activities:

- A literature review concerning effects of training in the implementation of EMS (ISO 14001) in industry and other organisations.
- A case study concerning training and communication in the implementation of EMS at the University of Gävle.
- A survey among staff concerning perception of training and communication during implementation of EMS at the University of Gävle.

The approach of the study is practical, positivistic and quantitative, although some qualitative elements are present. A significant input comes from the authors' experiences with the implementation of EMS in several industrial companies. The principal author has also previously studied EMS implementation in Small and Medium Sized Enterprises [26] and Swedish universities and co-ordinated, as Dean for Environmental Management, the EMS implementation at the University of Gävle.

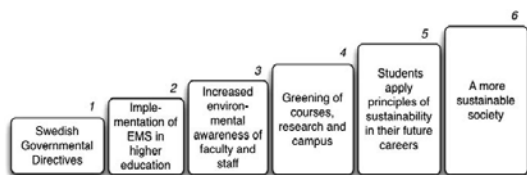


Fig. 1. The role of EMS in higher education in the steps towards a more sustainable society. Source: Sammalisto and Arvidsson [5].

2.1. Literature review

The literature review is mainly based on peer-reviewed articles in scientific databases published between 2000 and 2006 concerning the role of training in the implementation of environmental management systems in different organisations. The key words used in the search were ISO 14001, environmental management or sustainability together with implementation, and/or training and/or communication and/or awareness.

2.2. Case study

The explorative case study in a real-life context [27,28] is based on the implementation of an EMS at the University of Gävle. In 2004 the university had about 750 faculty and staff and 13,000 full and part time students, corresponding to about 6400 students on a fulltime basis [29].

2.3. Survey

A survey questionnaire was distributed to faculty and staff by email. The objective of the survey was to evaluate the perception of environmental training and communication as elements of the implementation of the EMS. The questionnaire focused on the following topics:

- Awareness, e.g., if the respondent was familiar with the intentions of the environmental policy, objectives and EMS procedures.
- Attitude, e.g., if the respondent perceived that the EMS had affected the daily work, if he/she had support from managers and supervisors, and if he/she perceived a personal responsibility to contribute to the university's environmental activities.

The participants were also offered an opportunity to make individual comments. In total 856 questionnaires were distributed by email.¹ The survey and analysis software program Business Intelligence 7.1 (BI-BASE 7.1) was used and the questionnaire included 21 pre-coded questions plus space for individual comments. A reminder was sent out to the participants a week after the first email. Because the principal author of the report was active in the implementation of ISO 14001 (e.g., training the faculty and staff, coordinating environmental committees, coaching students, etc.), some precautions were taken to avoid bias caused by personal involvement. The questionnaire was anonymous and the results were initially calculated using BIBASE and then in MS Excel. The initial compilation of data was reported in Erenlöf et al. [30].

All departments of the university participated in the survey. The response rate was 36.8%. The following functions, as defined by the respondents, were represented in the survey (%)

of total respondents): managers (6%); environmental co-ordinators (1%); lecturers (49%); administrative staff (35%); laboratory staff (2%); service functions (5%); and others (12%).² All ages were equally represented in the study with an exemption of the 40–49 age group which was somewhat under represented as compared to the University's overall age distribution (30% at the university compared to 24% in the survey). At the time of the survey the EMS was still in the implementation phase. A number of procedures were not yet implemented and all involved persons were not yet fully aware of their roles in the EMS.

3. Results

3.1. Environmental training in the implementation of EMS

The role and effects of training in the implementation of EMS are discussed in a limited number of papers published between 2000 and 2006. Some experiences of environmental training in association with EMS in industry are presented, but literature concerning methods and contents of training and communication in the implementation of EMS at universities is rather limited. Table 1 provides an overview of methods for and experiences of environmental training and communication in different types of organisations during the implementation phase of an EMS.

From Table 1 it can be observed that training is considered to be a key factor for successful implementation of EMS in industry and municipalities, that the majority of the employees should be included in the training and that training may change environmental behaviour. Studies that reflect EMS at universities point out that increased awareness and shared values are important factors in the greening of campuses.

3.2. Implementation of ISO 14001 at the University of Gävle

3.2.1. From commitment to certification

The initial environmental review was conducted in 1995 and the university's first environmental policy was published in 1996. In 1998 the university received the Swedish EMS Directives and in 2001 the University Board decided to aim for certification of the EMS according to ISO 14001 [31]. The University Board and management stated that the main aim of the EMS was to put emphasis on indirect environmental aspects, such as education and research. Training was considered essential for the success of the EMS project. As a target 80% of faculty and staff³ were to participate in environmental training.

Communication was seen as another important success factor. A variety of implementation activities were planned and the environmental review was updated in 2002. Education, travel,

¹ The 856 e-mail addresses to which the questionnaire was sent correspond to 735 individuals and 672 fulltime equivalents faculty and staff in May 2004. The 315 responses correspond to a response rate of 36.8% based on the 856 mails that were distributed.

² Since a person can represent more than one function at the same time, the total adds up to more than 100%.

³ Faculty and staff include all those employed by the university in different capacities. The total of 100% trained was considered impossible to reach due to all the different forms of employment in the organisation.

Table 1
Review of papers concerning the role and effects of environmental training in the implementation of EMS

Author and type of study	Main results and conclusions.
Babakri et al. [38]. Survey (I) Chattopadhyay [39]. Literature study (I) Daily and Huang [7]. Literature review (I) del Brio et al. [40,41]. Survey (I) Wee and Quazi [9]. Literature review and survey (I) Zutshi and Sohal [42,43]. Literature review, survey and interviews (I)	Training identified as a critical key factor for EMS implementation and changes in attitude.
del Brio et al. [40]. Survey (I)	In about 70% of the ISO 14001 certified companies more than 75% of management and staff participated in environmental training.
Strachan et al. [14]. Case study (I)	Strong commitment does not mean having structured training programmes. EMS creates behavioural changes and increased competence.
Burström von Malmborg [16]. Review of research and experiences from municipalities (M)	EMS important for communication (communicative action) and learning (organisational learning).
Beard and Rees [15]. Case study (M)	EMS transfers environmental rhetoric to change in the organisational culture.
Rondinelli et al. [13]. Case study, literature study, interviews (I)	ISO 14001 certification had one of its strongest impacts on behaviour. Increased awareness. Once the change in attitudes begins, it becomes difficult if not impossible to quantify the degree to which ISO 14001 certification was the causal factor.
Schulte et al. [25]. Literature review with focus on occupational health and safety (I)	Training raises awareness about health and safety issues.
Summers Raines [8]. Survey (I)	EMS spontaneously provides results of increased environmental awareness.
Zeng et al. [10]. Survey (I)	Training enhanced environmental awareness.
Moore et al. [44]. Collaborative inquiry (H)	Fundamental rethinking of university role required.
Cortese [3]. Vision paper (H)	Universities have responsibility to increase the awareness, knowledge and skills for sustainable future.
Dahle and Neumayer [45]. Survey and interviews (H)	Lack of awareness of sustainability concept the most important barrier to campus greening.
Herremans et al. [20]. Two surveys (H)	Proper commitment requires participation of everybody. Shared values created through communication activities.
Lozano [17]. Discussion paper (H)	All stakeholders must receive proper information and skills and reinforcement of them continuously.
Koester et al. [21]. Case study (H)	Summer course and workshops for faculty on basic concepts of environmental science and interaction between environment and society.
von Oelreich [46]. Case study (H)	The environmental policy aimed at increasing the awareness of employees. Activities included a letter to all employees and a training course.
Price [23] Case study (H)	Environmental awareness training to all faculty, staff and students.
Viebahn [24]. Case study (H)	Environmental training courses for staff offered.
Thomas [47]. Literature review (H)	There is a need for development of curricula concerning sustainability, but few institutions show acceptance. Increase in awareness would require training in some form.
Wright [48]. Review of definitions and frameworks for sustainability in higher education (H)	One university has policy that will facilitate ecological literacy among faculty, students and community through various activities.

The studies reviewed in this study may include additional results and findings. The table above only summarises results that are of special interest for this study. I, Industry; M, Municipality; H, University/higher education. Source: The authors.

procurement and use of resources were identified as significant environmental aspects. The review resulted in a revision of the policy and new environmental objectives and targets were introduced.

Implementation of ISO 14001 was successful and the university was certified in 2004. Some examples of improvements during 2004 are shown below [32]:

- Procedures were implemented for purchasing, handling of chemicals and hazardous waste.

- Procedures were implemented to improve the emergency preparedness.
- Paper consumption was reduced by 21%. The cost of waste handling was reduced by 20%. The use of heating was reduced by 2.5%.
- Educational programs that include environmental and sustainability aspects have increased by 34%.
- 85% of applications for research funding were assessed for environmental and sustainability aspects.

- Procedures were established to ensure that suppliers and tenants are informed about the university's environmental ambitions.

3.2.2. Organisational aspects of training and communication [33]

3.2.2.1. *EMS Project Team*⁴. A Dean for Environmental Management was appointed by the University President to coordinate the implementation of ISO 14001 (50% appointment). A part-time Project Team was introduced that consisted of the following persons: the Dean for Environmental Management; two lecturers experienced in supervising environmental management and auditing students in companies; a staff person involved in the procurement and service department of the university; a representative of the Student's Environmental Committee to provide student's perspectives on the project and to establish contacts and input to and from students; and a representative of industry to provide external feedback and to share industrial experiences with ISO 14001 implementation.

3.2.2.2. *Environmental Council*. The President appointed an Environmental Council in February 2002. The role of the Council is to support environmental activities in the different departments of the university. It consists of environmental coordinators representing each of the eleven university departments, the members of the Project Team and student representatives. The Dean for Environmental Management is the chairperson of the council. The environmental co-ordinators serve as communication links between each department and the Environmental Council. Their contribution is largely based on personal commitment to environmental issues. Maximum of 5% of the working time could be dedicated to the work as environmental co-ordinators.

3.2.3. Target groups for the environmental training

3.2.3.1. *Training of the Environmental Council*. The members of the Environmental Council had various backgrounds and knowledge of environmental issues. Experience and knowledge of environmental management systems, according to the structure of ISO 14001, was limited for the majority of the Council members. To establish a common ground, and to train the environmental co-ordinators in ISO 14001, a training programme was organised. A number of industrial companies were willing to act as mentors for the university, but this opportunity was used only minimally due to lack of time on the part of those involved at the university. The Council members received a CD with a basic environmental training course [34], and a compendium [35], as background material for the self-studies. Training sessions that lasted from one half to four hours were conducted as a part of the Council meetings. Table 2 shows the agenda for the training programme.

Environmental issues, for example, greening of curricula, training of faculty and staff, communication, recycling,

nonconformities and improvements as well as questions and feedback from the departments, are discussed at the Council meetings. This could be regarded as a form of continuous training. Finally, introduction to the updated version of ISO 14001 [18] was provided to the Council.

3.2.3.2. *Training of the Management Group*. The University Management Group consists of 23 persons. The President has the overall responsibility for environmental management, policy and legal compliance. Everyday work within the frameworks of legislation and ISO 14001 is delegated to the different members of the Management Group. Each manager (or comparable function) is responsible to manage environmental issues in his/her organisation. The Dean for Environmental Management is responsible for the co-ordination of the implementation and maintenance of ISO 14001. An important task is to frequently inform the Management Group about the progress of the different activities. EMS is therefore discussed frequently in the Management Group at the initiative of the Dean for Environmental Management. Typical issues that are brought up are:

- environmental aspects, policy and strategy (in connection with the annual reviews);
- legal and other requirements;
- curricula and environmental issues;
- organisation, resources and training; and,
- results of internal and external environmental audits including feedback and improvements that have been completed and that are required.

To introduce ISO 14001 to the Management Group a training session was organised. The training included the basics of EMS and experiences from the implementation of the system at another university. The managers also participated in the general training for their faculty and staff (see below). Finally, the Management Group, together with the Environmental Council and other key persons, received an introduction to environmental legislation that is relevant to the university. The latter activity continues with updates twice yearly.

3.2.3.3. *Training of faculty and staff*. Training of faculty and staff was cascaded down in each department according to a shared training programme. The different departments were able to modify the training to suit their character provided that the main ingredients of the content were retained. A training package was made available for the lecturers (in most cases the environmental co-ordinators). The training included, for example:

- Introduction to environmental/sustainability issues.
- Introduction to EMS. Direct and indirect environmental aspects of the University of Gävle.
- Interactive game ("Space trip" game).
- Group discussions.

3.2.3.4. *Training of new employees and students*. New employees receive a copy of the environmental policy when they first receive their keys, and are informed about the structure

⁴ The organisation of the implementation process is described at the university's home page <http://www.hig.se/miljo/>.

Table 2
Training of the Environmental Council

Training module	Purpose of the training	Literature
<i>Spring 2002</i>		
Motivation for environmental work, Introduction to ISO 14001, certification and environmental review.	To provide an introduction to the certification project together with the management group of the university.	Material provided by the lecturers at the university.
Environmental terminology A description of operations at each department. A guided tour of the waste handling facilities of the university.	To learn what environment, environmental aspects, environmental management system, environmental impact, to start thinking of the department as a unit and to prepare for the environmental review.	Material provided by the lecturers at the university and the industry representative.
An introduction to environmental terminology and a description of operations at each department.		
A guided tour of the waste handling facilities of the university.		
Environmental review ^a	How to conduct the environmental review at each department and the entire university.	Brorson et al. [35].
Environmental training and communication.	To prepare the environmental co-ordinators how to conduct training and to facilitate communication activities.	Training package Sammalisto [49].
<i>Autumn 2002</i>		
Evaluation of environmental aspects.	Provide common ground for the evaluation of environmental aspects and establish how to conduct the evaluation.	Support of an external consultant.
Environmental policy and objectives for the university.	To prepare a revised outline of policy and objectives to the Management Group and the University Board.	ISO 14001 standard.
Environmental targets.	To prepare a proposal for the Management Group and the University President ^b .	Material provided by the lecturers at the university, and the industry representative.
<i>Spring 2003</i>		
Environmental audits.	Some of the environmental co-ordinators went on to further training to be able to function as internal auditors within other departments of the university.	Brorson et al. [35].

^a A survey concerning travelling patterns and use of paper and energy was conducted among the university faculty and staff as a part of the environmental review. The reply rate was 57%.

^b Since 2005, targets are taken by the different departments based on the university objectives. Source: The authors.

of the EMS and relevant policies and procedures during the introduction at their department. First-year students receive the University's environmental policy in their welcome package and receive additional environmental information at the beginning of their studies. The same information package is also provided to all foreign students arriving at the university.

3.2.3.5. Training of environmental auditors. Internal environmental auditors were appointed and trained in auditing methods. Several of the environmental co-ordinators were trained as auditors together with a number of representatives from local industry and the municipality of Gävle. The auditor training lasted for three days conducted over a three-month period and included:

- Environmental auditing in theory and practice.
- How to plan the environmental audit.
- How to conduct the audit (document review, interviews, site inspection).
- How to report the environmental audit.

The course included practical assignments to be completed between course days and a requirement to conduct an internal

audit within their own organisation. Currently there are seven internal environmental auditors at the university. In addition to that, students may participate in internal audits based on their studies in environmental management and the auditors' course.

3.2.4. Communication

During the implementation of the EMS significant emphasis was placed on communication of environmental issues. The main target groups were students, faculty, staff, the Environmental Council, the Management Group and the Board of the University. Several channels were used for communication, for example internal and public websites, information booklets, department meetings and other meetings. To communicate some of the core elements of the EMS (i.e. environmental policy, objectives and targets), draft documents were posted for consultation and input on the website. In addition, information and discussions were arranged at different levels of the university. Continuous review of all education programmes and courses for their coverage of environmental and sustainability issues was initiated. Discussions concerning environment and the university's curricula were taken up in regular departmental meetings chaired by the President

and/or the Dean for Environmental Management. The Dean for Environmental Management also organised meetings concerning the practical aspects of implementation of ISO 14001.

The university magazine (Högaktuellt), the student magazines (DassHögtryck, Gefla Högtryck), and the university homepage were used for communication purposes. The complete documentation of the environmental management system was placed at the environmental homepage on the university website. In addition, the environmental co-ordinators forwarded information and decisions from the Environmental Council to the different departments and vice versa. Staff mail was used on a few occasions to focus on special issues. An environment theme day (Framtidseko, 'Future echo') was arranged. The activities included panel debates, exhibitions, participation of local companies, competitions, and speeches by interesting performers. The day ended with activity where the current batch of environmental and science students met with previous batches.

3.3. Perception of training and communication

As described above a substantial amount of activities took place to create commitment to the EMS and to provide information about its utilisation in daily work. This gives rise to two important questions: Were the resources allocated to training and communication adequate? Was the content of the training relevant to the needs of the participants? The survey among staff and faculty resulted in the following observations.

3.3.1. Participation in training

Several training opportunities were offered to faculty and staff of the ten departments of the university including the Office of Student Affairs. In average 73% of respondents reported that they participated in environmental training. Four departments showed a rather low participation rate ($\leq 62\%$ of employees). The participation rate in the other six departments was $\geq 78\%$. 86 persons (28.5%) provided a reason for not attending the training. Lack of time was indicated by 36%, lack of motivation by 13%, and holiday or sick leave by 7%. The remaining 44% indicated "other" as a reason for not attending the training.

3.3.2. Relevance of the environmental training

About 60% found the environmental training "very relevant" or "relevant" (Fig. 2). The reported relevance of training varied from about 30% to 84% between departments.

3.3.3. Awareness and attitude

Participation in training showed a positive correlation with the awareness of the key elements of the EMS. Generally the knowledge about the environmental policy, objectives, routines and documents could be considered as high (Fig. 3). More than 82% of staff and faculty were aware of the policy. About 83% of the persons reported that they knew where to find the documents and procedures related to the EMS. This can be considered a high level of awareness since many of the documents were not yet fully implemented. Sixty-three percent of the persons claimed awareness of the specific

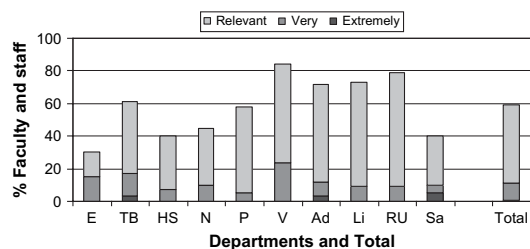


Fig. 2. Reported positive perception of the relevance of the environmental training. Department of Business Administration (E), Department of Technology and Built Environment (TB), Department of Humanities and Social Sciences (HS), Department of Mathematics, Natural and Computer Sciences (N), Department of Education and Psychology (P), Department of Caring Sciences and Sociology (V), Administrative department (Ad), Library (Li), The Offices of the President and Education and Research (RU), The Office of Student Affairs (Sa). Source: The authors.

EMS procedures that affected the daily work. With reference to industry the figure appeared to be realistic at that stage of the implementation of the EMS. It should also be noted that about half of faculty and staff stated that they were not affected by the EMS.

Participation in training showed a correlation with a more positive attitude towards the EMS. Overall, 52% faculty and staff claimed in the survey that they were motivated to actively work with environmental issues at the university. Within five departments the reported motivation was quite high ($>60\%$). Low motivation ($<35\%$) was reported from three of the departments.

3.3.4. Support from managers and supervisors and personal responsibility

According to studies of EMS in industry and other organisations (Table 1) involvement and support from top management is essential for a well functioning EMS. This is also clearly manifested in the ISO 14001 standard. In a section of the questionnaire faculty and staff were asked about how they perceived the support from managers and supervisors. Support for environmental work varied from "very little" to "great". On average 74% (range 28–93%) of the persons reported support from their managers and supervisors.

The personal involvement ("own responsibility") in the EMS was considered as high (on average 84%; range 57–100%).

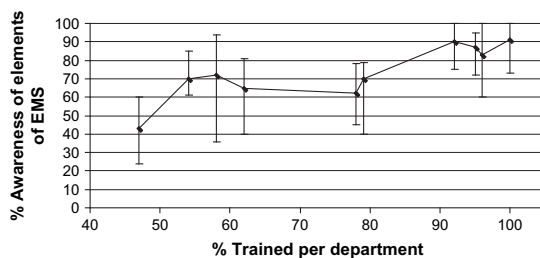


Fig. 3. Awareness of environmental policy, objectives, procedures and EMS documentation as a function of participation in training per department. Source: The authors.

The motivation for environmental issues appeared to be somewhat higher than the sense of personal connection to the EMS. This would indicate that some people were motivated although they did not always see the connection to their own work. Low personal responsibility was reported by persons working at departments where the connection to the EMS was not perceived as obvious.

3.3.5. Circumstances that interfere with the ambitions for environmental work

The factor that was most frequently reported as interfering with the personal ambitions was the “lack of time” (Fig. 4). “Personal interest” in environmental issues was perceived as a circumstance that contributed positively to the engagement (63% of the participants). Less than 10% of faculty and staff stated that “lack of information”, “knowledge” and “support” were greatly limiting their personal environmental ambitions. Nonetheless, a majority of the individuals indicated that there was sufficient “information” (73%), “support” (79%), “knowledge” (78%) and “personal interest” (91%) to be engaged and to participate in the environmental work at the university.

3.3.6. Contribution to sustainable development

The final question in the survey dealt with the views of personal contribution to sustainable development. A number of persons indicated that they contributed to sustainable development but many others did not indicate any contribution at all (Fig. 5). People in functions such as “education”, “research”, “collaboration with society” and “service” recognised a potential to contribute to sustainable development. On the contrary, several persons in the same functions concluded that they could not contribute, did not know, or considered the topic as not relevant.

4. Discussion and conclusions

4.1. Training and communication are important elements of the EMS

Implementation of ISO 14001 will, to a major or minor extent, change the everyday life of many employees in

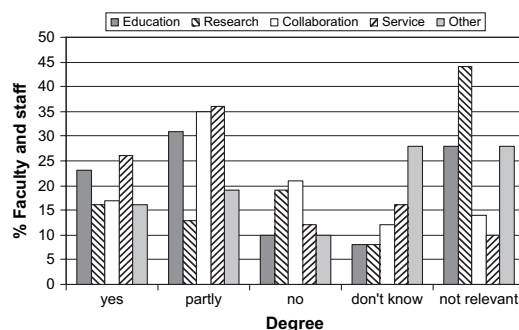


Fig. 5. Perceived contribution to sustainable development. Source: The authors.

a company or other organisation. Policies, objectives, procedures, instructions and many other elements of the standard will be introduced and all managers and employees are expected to understand his/her role in the system. The intention of this study was to present methods of EMS training and communication at a university and to analyse how staff and faculty perceived the training. Some of the most relevant findings are commented upon below.

4.1.1. Top management commitment and external drivers

In all organisations top management commitment is essential for the implementation of the EMS. At the University of Gävle the combination of the Swedish EMS Directives, and the decision by the University Board to strive for the ISO 14001 certification, triggered the implementation of the EMS. Another prerequisite was that an effective organisation for implementation and maintenance of the EMS was created. Similar experiences of commitment and external drivers are shared by industry. In industry, requirements from customers are examples of important external drivers for the implementation of EMS.

4.1.2. Focus on the significant environmental aspects

Manufacturing companies need to manage a number of direct environmental aspects, for example, emissions to water and air. Information about such issues will therefore become a natural part of the training, and the employees will easily understand the interaction between the EMS and the everyday work. At a university there also exist a number of direct environmental aspects, for example, hazardous waste at the laboratory facilities. However, indirect environmental aspects will dominate in many of the university departments. Such indirect aspects are, for example, associated with knowledge, awareness and action competence. Students and researchers will hopefully, later in life, apply the environmental knowledge to their professional and private spheres (see Fig. 1). This may result in a considerable positive environmental impact for the coming decades.

The EMS implementation team has an important task to introduce the concept of indirect environmental aspects at a university. To convince lecturers and researchers that the

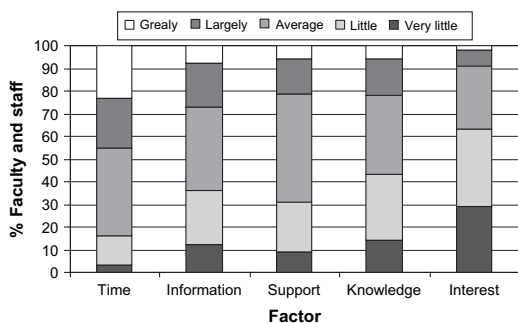


Fig. 4. Circumstances reported as interfering with personal ambitions for environmental work. Source: The authors.

greening of the university involves the introduction of future oriented environmental and sustainability issues in courses and research is an interesting and challenging task.

4.1.3. Methods for training

Environmental training is one of the critical factors in the implementation of EMS in industry and other organisations. According to the literature review (Table 1), and experiences from industry, the general training should include the majority of the managers and employees. In addition to that, certain functions will need more detailed knowledge about the EMS.

This study shows that training methods inspired by industrial experiences can successfully be applied in a university setting. There are, however, some differences in organisational hierarchies and learning traditions in industry as compared to a university. Training of lecturers and researchers may therefore need to be adjusted to the academic traditions. For example, a culture of “loyalty to discipline” rather than to the employer, “academic freedom” and “critical thinking” [36] may result in a need for more interactive training methods. Discussions and seminars may therefore be used instead of traditional one-way teaching methods. Informal training and information can also be provided during regular meetings. Finally, members of the EMS training team should also be prepared to participate in lengthy, and sometimes complicated and interesting, discussions concerning all kinds of environmental and sustainability issues.

4.1.4. Methods for communication

Several methods for the communication of the EMS were applied at the University of Gävle. There is nothing in this study that supports a different approach to communication at a university compared to industry.

4.1.5. Perception of training and communication

Environmental training and communication resulted in increased awareness about environmental issues and a deeper understanding of the individual roles in the EMS. Also, positive changes in attitudes toward environmental issues were observed among faculty and staff. For a number of different reasons some individuals did not recognise their personal connection with the EMS and did not see any personal contribution to sustainable development.

4.1.6. Greening of curricula

The challenges for the EMS project team will certainly increase when indirect environmental aspects are introduced and the concepts of greening of curricula and sustainable development are presented. It can be difficult to motivate busy lecturers and researchers to participate in environmental activities that may not traditionally be connected to their field of expertise and where future environmental consequences are difficult to foresee and monitor. Special skills are therefore needed when communicating with lecturers and researchers. Further, a methodology will be needed to motivate faculty members to assess the content of current courses and research projects. The aim should be to seek possibilities to introduce

environmental and sustainability issues into teaching and research. In many cases the connection between the EMS is obvious, e.g. in the natural sciences, health sciences and economic fields, whereas in others it may be harder to find sufficient reason to introduce environmental aspects. It should be emphasised that the aim is not, of course, to require all courses and research projects to address indirect environmental aspects, only those where the connection is natural and relevant.

4.1.7. EMS at universities

EMS as specified in the International Standard ISO 14001: 2004 is a rather new tool to be applied in public agencies. Some of its requirements may appear to be provocative, or too normative, for university faculties representing different disciplines and academic traditions. Despite of these concerns, and based on the experiences from the University of Gävle, the authors are convinced that the standard can be applied as a tool to provide structure for environmental issues at any university. A well-structured EMS will increase environmental awareness among staff, faculty and students, and the relevance of environmental issues in the university context can be developed further. This is one way in which the higher education institutions can make an important contribution to the sustainable development of society. Therefore, the question of how the awareness of environment and sustainability issues can result in concrete action in university courses and research programs needs to be studied further.

4.2. Epilogue

Implementation of EMS at the University of Gävle has resulted in improved environmental performance. Increased environmental awareness and a more structured way to manage environmental issues have contributed to the improvements. In addition, internal and external environmental audits play an important role to identify non-conformances and to introduce corrective actions. It can also be observed that the environmental management reviews often results in constructive discussions concerning the overall environmental strategy of the university and the function of the EMS. Examples of ongoing initiatives to improve the EMS are:

- The register of significant environmental aspects has already been updated two times and there is now more focus on the indirect environmental aspects of education and research.
- The University Board updated the environmental policy and introduced a comprehensive policy for environment and sustainable development in December 2005. One of the drivers for the proposed expansion of the policy is the recently revised Swedish Higher Education Act where sustainable development is highlighted [37].

What will then be the future of the environmental management system at the university? Of course you could quote the old line that says that “top management commitment is essential for the implementation of the EMS” and hope for the best.

However, as observed in industry, management commitment certainly is an important success factor, but if the EMS fails to be integrated in the overall management system problems will sooner or later occur. If the short run people may be satisfied by “doing things in the right way”, but in the longer perspective it is more essential to “do the right things”.

If the EMS in industry, for example, contributes to savings, legal compliance, business opportunities and customer satisfaction, top management will keep focus on the system. There are numerous examples that if an important customer requires that the supplier should be able to show compliance with ISO 14001, the system will be implemented. In the framework of a university savings and legal compliance are obvious driving forces for the implementation of the EMS, but words like “business opportunities” and “customer satisfaction” are probably not used too frequently in association with environmental issues. However, in the case of the University of Gävle, the Swedish Government can be seen as a customer and therefore the Government directives to implement EMS triggered, although not enforced, the certification process. Without this external driving force the implementation might have been a bit more difficult. Finally, training and communication are very important activities, in industry and at universities, to continually inform and motivate management and employees about internal and external driving forces and to demonstrate the practical and economical benefits of the EMS.

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Paper IV

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Integration of Sustainability in Higher Education: A Study with International Perspectives

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Abstract: This study examined the impact of a procedure implemented and used at one Swedish university to promote integration of the concept of sustainability into courses. The study is based on a literature study and a case study at the University of Gävle in Sweden, where faculty members are asked to classify their courses and research funding applications regarding the contributions thereof to sustainable development. The results of the study indicated that this procedure can indeed stimulate faculty members to integrate sustainable development in their courses. It is clear that the reported changes in courses were also influenced by other factors such as the increased general awareness of environmental issues

Keywords: Curriculum, environmental management, indicator, sustainable development

In 2006 the Swedish Parliament amended the Swedish Higher Education Act to

include the statement: “Universities shall, in their activities, work for sustainable development, which means that present and future generations are assured of having a healthy and good environment, economy, and social welfare and justice” (SFS 1992:1434, translation by authors). The amendment is supported by the fact that years 2005 to 2014 have been declared the United Nations Decade of Education for Sustainable Development (UNESCO, 2002), which provides a tremendous opportunity and challenge for all levels of education.

The Problem

One must ask, however, what the phrase “in their activities, work for sustainable development” means for institutions of higher education? As illustrated by the quotation from the Swedish Higher Education Act above, the concept of sustainable development incorporates not only an environmental dimension but also economic and social dimensions, and

frequently also a cultural dimension. That education and research play a key role for the long-term development of society is hardly disputed by anyone; but how to integrate sustainability effectively into higher education and, in particular, into the curriculum and the design of research projects is still a debated issue.

Background

In higher education, the level of integration of the concept of sustainable development can range from mere formulations of policy statements to integration into courses, curricula, and other selected activities for a total reform of the educational system. A more practical approach to promote sustainable development is to work with tangible environmental impacts. In Europe, North America, and other regions there are good examples indicating that greening the campus, e.g., improved waste management, energy saving innovations, is making operations more environmentally sustainable. Such changes do not meet major resistance since they lead to economic savings (Fisher, 2003; Herremans & Allwright, 2000; Price, 2005). There are also several studies of calculations of ecological footprints⁶ for universities (Flint, 2001; Ruy & Brody, 2006; Segalàs, Ferrer-Balas & Carrillo, 2004). However, the initiatives to promote the concept of sustainability in higher education have so far actually had little impact on education (Wright, 2004).

Sterling (2004) has presented a model for integration of sustainability in

education, and there is a North American parallel to be found in the discussions of integration of diversity issues (Stanley, 2000-01). Sterling called the first level accommodation “*bolting-on*”, i.e., adding the concept of sustainability to the existing system, which in itself largely remains unchanged. This is “education *about* sustainability” and can consist of separate courses about sustainability for students.

Sterling called the second level of integration, which is a deeper level of response, “*building-in*”; and this means that ideas are incorporated into existing systems, e.g., greening the curriculum and institutional operations. This level could be called “education *for* sustainability”, and it includes integrating sustainability issues into regular discipline-specific courses. It aims at creating a connection in the minds of students between the subject in question and sustainable development. Focusing on technical and economic programs as well as teacher training programs, some of the earliest such initiatives in Sweden to work with the greening of higher education were done as projects sponsored by the National Council for Renewal of Higher Education. The results from projects in 27 universities indicated a positive impact on students, particularly for engineering students in the smaller universities. The greening of engineering programs was spread over a larger number of subjects as compared to programs in the discipline of economics, in which greening was limited to the core subjects (Sammalisto, 1999). An approach somewhat similar to the Swedish one has been used in the Netherlands based on *disciplinary reviews*. This approach poses an intellectual challenge to instructors to integrate sustainability within each discipline by “exploring the relationships between various disciplines and sustainable development” (Appel, Dankelman & Kuipers, 2004).

⁶ The ecological footprint is defined as the land that would be required to support a certain activity, for instance a specified group’s lifestyle, forever. Included in the ecological footprint calculations are both the extraction of raw materials and the absorption of pollution in a long term sustainable way.

The third level is called *transformation*, which means a complete re-design of education based on sustainability principles. This level would require a paradigm change so that education would be built on learning *as* change and education *as* sustainability. In practice, this would mean that the goal of all education would be sustainable development, and the different disciplines and subjects would all contribute to it. An example of a model for integration to this extent is the one presented by Juárez-Nájera, Dieleman & Turpin-Marion (2006). They presented a framework for a culture where holistic understanding is the focus of education rather than specific knowledge or skills: “Students must learn new and sustainable ways of looking at the world, themselves and their professions.” (p. 1037).

Though there are quite a few published case studies on the environmental aspect of sustainability, the authors have only been able to find a few dealing with the broader concept of sustainability. Ferrer-Balas, Cruz, Segalàs & Sans (2006) discussed the difficulty of integrating sustainability in curricula. After studying keywords appearing in course descriptions and objectives at the Technical University of Catalonia since 1997, where 30% of the final theses now have a chapter with environmental considerations, the researchers concluded: “Due to strong impermeability of the curriculum it has not been possible to deeply revise the curricula from a sustainability perspective, only from the environmental one, mainly by adding contents to it” (p. 3).

A study by Holt (2003) indicated that discipline-specific modules (courses or course components), “when environmental modules are integrated in corporate and management classes” (p. 329), are more important than courses designed to increase awareness of sustainability. This statement, based on a

study of the “impact of education and cultural experiences of business school students during their three years at the University” (p. 331), supports the idea of integration rather than separate courses. This finding is contrary to practice in many universities, where the main focus has been on establishing general environmental courses, thus providing an overview of environmental problems, concepts and approaches, rather than linking the concept of sustainability to a particular field of study.

The problem of weak connections between and among statements, policies, and practices has been reported in a number of case descriptions. Segalàs, Cruz & Mulder (2004) studied the Technical University of Catalonia in Spain, Delft University of Technology in the Netherlands, and Tecnológico de Monterrey in Mexico and concluded that these universities were early adopters of environmental policies and that they have had ambitious plans to also include elements of sustainable development, including values. For various reasons, their goals have not been achieved; and what is offered today is a number of greened, mostly environmentally focused courses, mandatory or optional for the students. Other scholars have identified problems such as lack of highest administrative commitment to work of integrating sustainability, lack of follow-up procedures, failure to recognise and accept the importance of environmental and sustainability problems, limited time and resources, and the prevailing academic culture (Lidgren, Rodhe & Huisingsh, 2006; Sammalisto & Arvidsson, 2005; Segalàs, Ferrer-Balas & Mulder, 2005).

According to Shriberg (2002), issues that are important in assessing sustainability in higher education deal “with the core issues of ecologically, socially and fiscally sustaining society and campus” (p. 256). One must then ask how

we operationalise these issues. One of the first to make an effort was Penn State Green Destiny Council (2000, p. 4). They defined indicators for higher education based on David Orr's definition of sustainability-based culture (Orr, 1996).

As stated above, there are good examples of campus greening efforts and environmental management. What is lacking, however, is empirical research on this subject; and, even beyond this area, there is a lack of studies on the broader topic of integration of sustainability in education and research. Moreover, available case studies rarely include information about research methods (Corcoran & Wals, 2004). It is also an important research task to include in the analysis dimensions of sustainable development beyond the environmental.

The Study

With our study we wanted to contribute to the understanding of how to integrate sustainability into education and research by examining the method for integration and, in particular, the procedure for the classification and review of university courses and research projects for integration of sustainable development at the University of Gävle. This university is the only one in Sweden which has developed a formalised classification procedure for courses and research projects, consisting of a form to be filled out by the responsible instructor/researcher. Specifically, we wanted to find out how different disciplines integrate sustainability in their courses and how they incorporate a sustainability assessment of the research in the applications for research funding. From the study we then expected to be able to draw implications for other institutions.

This research is part of a bigger effort on the part of the authors to understand the role of environmental management

systems⁷ (EMS) in higher education in Sweden. The issue is approached from a six-step model as described in Figure 1 below. Steps 1-3 have been reported in previous publications (Sammalisto, 2004; Sammalisto & Arvidsson, 2005; Sammalisto & Brorson, 2006). This article looks closer into part of the fourth step – the greening of courses and research efforts.

The Classification Procedure

In 2005 the University of Gävle had about 750 faculty and staff and 13,500 full and part time students, corresponding to about 6,200 full time equivalent students. The University has six colleges: Business Administration and Economics; Technology and Built Environment; Humanities and Social Sciences; Mathematics, Natural, and Computer Sciences; Education and Psychology; and Health Sciences and Sociology.

⁷ An environmental management system (EMS) is part of an organization's overall management system and is used to develop and implement its environmental policy. EMS can be certified according to the international standard ISO 14001. Today more than 100,000 organizations, mainly industries, but also a growing number of other types of organizations, have achieved such a certification. The president of the university has the overall responsibility for the EMS and its results, but delegates the responsibilities within the regular university organization so that the objectives can be met. In Sweden the implementation of EMS as a way to work towards sustainable development was initiated by government directives to all public agencies, including the 35 public universities, during the period of 1998-2001.

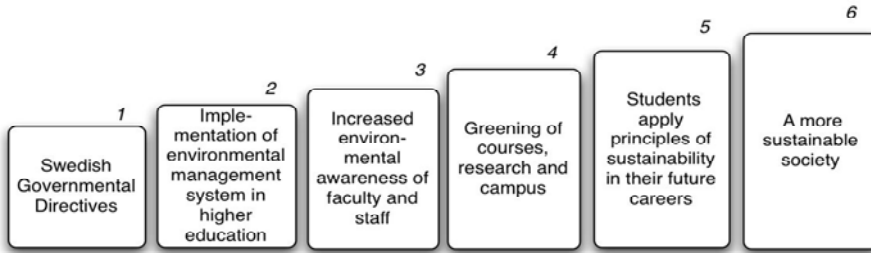


Figure 1. The role of Environmental Management Systems (EMS) in higher education in the steps towards a more sustainable society. (Sammalisto & Brorson, in press)

As part of the environmental management system, instructors are requested to classify their courses based on their environmental and sustainable development (E/SD) content, using the definitions provided and the Policy for Environment and Sustainable Development of the University as guidance. The classification, which was developed by the University Environmental Council⁸ and discussed in meetings in the different colleges, is very simple, and the instructor just has to check one of four boxes according to the definitions shown below:

A – A **major** part of the course has E/SD content;

B – The course has **some** E/SD content;

C – The course has **no** E/SD content, but has the potential for this; or

D – E/SD content is **not relevant** for the course.

In addition space is provided for writing an explanation of the reason(s) why the course was so classified. It is not mandatory to provide such an explanation, but the administration recommends doing so.⁹

Although the classification of the courses was to take place whenever a new course was introduced or an existing one revised, all colleges voluntarily also started working on existing courses. The system was implemented in 2002, and by the end of the 2005 82% of all current courses at the University had been reviewed in this regard. By decision of the President, a similar classification form for inclusion with applications for research funding was introduced in 2005. The manager of the research project is responsible for this classification. For 2005, 90% of the applications included an E/SD

⁸ Every College at the University has appointed a staff member to act as environmental coordinator. These together with the vice-president (acting as chairperson) and student representatives form the Environmental Council of the University. The coordinator is responsible for collecting information about the environmental and sustainability performance of the institution, reporting to the Environmental Council, and giving advice to faculty and staff in the college.

⁹ More detailed information about the environmental program, for instance the policy, the environmental management system, and the course and research classification forms can be found at: www.hig.se/miljo/.

classification. However, not providing an E/SD classification does not lead to any sanction.

The Method

For this study we reviewed the completed classification forms for all the 1317 current courses and all the 125 research funding applications for the year 2005. Swedish law guarantees access to this type of information in any state organization, and this type of study does not require any form of institutional approval. The explanations provided in the classification forms were interpreted by two researchers independently and gathered in an Excel-sheet as the basis for statistical presentation. We should point out that the amount of effort spent on classifying the courses and research projects is likely to be very different on the part of the individual instructors/ researchers; but the initial interpretations by the two researchers proved to be identical for all but a small number of forms, for which consensus was found through discussion.

In addition to studying the classification forms, 15-minute semi-structured interviews were conducted with 13 instructors/researchers in order to explore their experiences of working with the classification procedure and their understanding of the concept of sustainability; and we wanted to understand in more detail how the work of integrating sustainability in courses has progressed. The instructors, most of them also active researchers, were chosen partly based on their availability at the time of the interviews. However, so as to have a wide representation of disciplines they were also chosen to represent at least two different subjects in each of the five colleges considered relevant for a deeper analysis. As all classifications in the College for Business Administration and

Economics had been done by one person and without adding explanations, this college was not chosen for interviews. We compared the notes from these interviews and sorted them into the main issues covered in the questionnaire used as the guideline for the interviews. The 13 persons interviewed is a small sample of all the faculty members at the University, which limits generalizability. However, these interviews offered the possibility of identifying new issues and allowed us to gain a better understanding of the actions taken and the arguments of the individuals.

Although it is likely that some of those interviewed were affected in their replies by one of the interviewers, whom they recognised as a key person in the introduction of the classification system and the environmental management system in general, most of them appeared to reply with directness. We did not perceive that the interviewees were deliberately hiding any critical comments. This openness has also been observed in other studies made at the University by different people in connection to EMS implementation (Erenlöf & Flodin, 2007; Abasi, Hannula & Nord, 2007) and has also been mentioned in comments in connection to the environmental audits, which are a mandatory part of the certified environmental management system.

Results

Classification of Courses

Table 1 shows how the instructors classified their courses with the codes A-D (explained above). The table also shows the proportion of courses classified with an added explanation. It further shows that a clear majority of courses have been classified but that there are considerable differences among the departments.

Table 1: Courses and Classifications

Colleges	Number of courses	% not classified	Classified courses				% of classified courses with explanations
			%A	%B	%C	%D	
Business Administration and Economics	149	0	6	29	51	14	0
Humanities and Social Sciences	308	25	6	30	12	25	51
Technology and Built Environment	252	25	10	36	13	17	73
Mathematics, Natural and Computer Sciences	341	28	16	17	7	32	20
Education and Psychology	150	39	7	35	7	12	79
Health Sciences and Sociology	117	65	1	21	12	1	100
Total	1317	28*	9	27	15	21	44

Classification system: A = a major part of the course has E/SD content; B = the course has some E/SD content; C = the course has not yet any E/SD content, but has the potential for that; D = E/SD content is not relevant for this course.

* 28% not classified is valid for all courses since 2002. 18% of courses offered during the year 2005 were not classified.

Figures 2 and 3 show how the courses have been classified on the different dimensions of sustainable development. Figure 2 shows all classified courses that have an explanation, which allowed us to specify the course as reflecting the environmental dimension. These results are curious in that the expected dominance of the environmental dimension of sustainable development, as found by Ferrer-Balas et al. (2006) in their study of technical universities, is, at the University of Gävle, only true in the Department of Mathematics, Natural and Computer Sciences and the Department of

Technology and Built Environment. Many of these courses also demonstrated connections to other dimensions of sustainability in the explanations; and the results in the other departments such as Humanities and Social Sciences, Education and Psychology, and Health Sciences and Sociology where social and cultural dimensions dominate, show a different picture. Figure 2 also shows the percentage of the courses that have not only the environmental dimension, but in addition one (2d), two (3d) or three (4d) of the other sustainability dimensions.

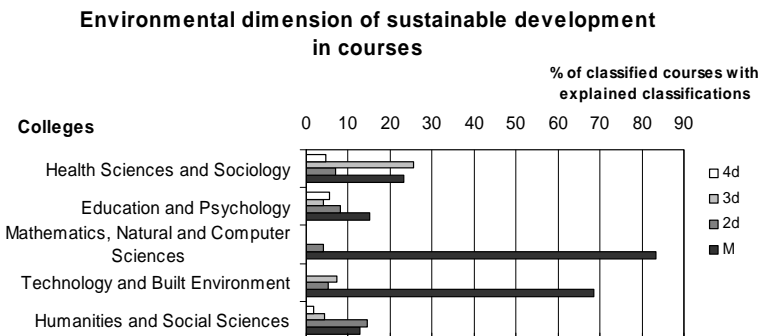


Figure 2. The percentage of courses in the five colleges classified as having an environmental dimension (M) of sustainable development. 2d, 3d, 4d include the environmental dimension together with one, two or three other dimensions of sustainability (economic, social and/or cultural).

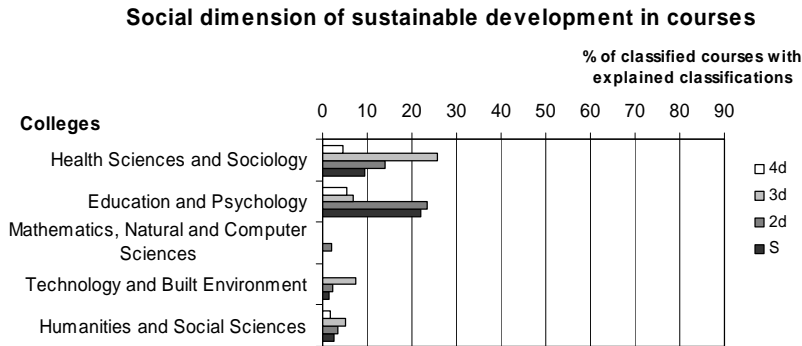


Figure 3. The percentage of courses in the five colleges classified as having a social dimension (S) of sustainable development. 2d, 3d, 4d include the social dimension together with one, two or three other dimensions of sustainability (environmental, economic and cultural).

Figure 3 is similar to Figure 2 but focuses on the social (S) dimension as the first of the sustainability dimensions.

Classification of Research Projects

For 2005 there were 125 applications for research funding of which 90% were E/SD classified; and 71% of this number included explanations of the classification. Seventeen percent of the classifications with explanations were classified as A (the research project represents a major contribution to E/SD); and nearly half, 49%, were classified as B (the research project represents a minor contribution to E/SD). Sixteen percent of project managers indicated that a contribution to a E/SD was not relevant to their project, and 7% were not sure of the project's contribution to E/SD. It appears that most of the research applications with explanation of the classification included more than one dimension of sustainability. Thirty-two percent of the applications combined the social dimension with one other dimension, while the corresponding figures for a two-dimensional combination with environmental and cultural aspects are also frequent: 21% and 20% of the research projects.

Interviews

In the interviews the instructors/researchers were asked about their experiences with the classification system, the outcomes, and their definitions of sustainable development. Nine of the thirteen interviewees had discussed the classification of their course(s) with their colleagues, three had done it alone, and one did not remember how he had done it since he is "allergic" to all kinds of forms. No one was concerned about the time required for this process. The difficulty for half of the interviewees was that they were forced to think about "new things ... never thought about before". (N.B. All comments from the interviews have been translated from Swedish to English by the authors of this article.) One instructor commented: "Our first reflection was that it is something big, and not relevant to us. Then we started thinking that maybe there is something in it, and finally we saw it with a longer perspective, that this is right for us." Several of them mentioned having a lot of discussion about the issue in various groups. Two instructors had experienced difficulties later when the initial environmental dimension was extended to other perspectives of sustainability.

The three interviewees who were most critical of the procedure saw the classification as a forced administrative exercise from the top, and one commented that it was “the least amount of trouble to fill out the form and send it further” rather than to start a discussion about the procedure. The lack of importance of the issue, they claimed, was illustrated by the fact that there is nothing about such issues in the self-evaluations required by the Swedish National Agency for Higher Education. However, one of them stated that he has now started thinking more about the direct environmental aspects, such as material use, in his course.

Ten interviewees defined sustainable development mainly in environmental terms such as use of scarce resources and recycling. Two of them talked of it as being linked to economic and worker health and safety issues: “For example the design of a factory also affects the need for transport and consequently energy consumption.” One more critical voice saw sustainable development as an “uninteresting political buzz word” along the lines of the classless society in the 1980s, and thus a policy area for the government. Two of the interviewees pointed to a broader perspective: “Culturally, every generation must win back, for example, democracy. The more open and democratic a society is, the better the environment.” Or even wider: “With every step you take you should be aware of and responsible for the consequences of your actions.”

Although it is not possible to attribute all changes in courses to the classification process, it is apparent that changes have taken place according to eight of the interviewees. One has changed the course plan by adding a new lecture or assignment concerning environmental issues related to the subject in question. Several of the interviewees said they were more aware of the importance of

proactive environmental thinking and also aware of the potential for environmental impact through indirect measures, such as teaching. Not all of them had made conscious changes in their courses, but among those who had not made any changes one commented that he was now more ready to answer student questions about these issues. One instructor regularly shows the classification form to her students at the beginning of the course so as to raise their attention to these issues. The direct environmental impact of using fewer printouts and copies were mentioned by one lecturer, whereas another one, who had initially been motivated by such direct aspects of paper usage, was now thinking in terms of the course content.

When asked about how they believed the forms were used after they had been filled out, ten of the interviewees assumed that they were filed and used for internal and external statistical reporting or the environmental audits mandated by the certified environmental management system. Only a few of them had previously thought about usage of the forms. Six of them remembered receiving feedback from the head of department or the environmental coordinator after the classification form was submitted. One person indicated there is a problem with the overwhelming amount of information: “You only take in what appeals to you and leave out what you do not need; there is a high barrier to what you are listening to.” An instructor who had experience with quality management practices in industry drew a parallel: “If you do not have follow-up, you cannot see the continuous improvements and the system is just paper in files.”

Suggestions for Improvement

Six interviewees brought up the benefit of discussing the classification with colleagues, preferably including someone with knowledge and competence

concerning environmental issues. It was also perceived as beneficial if the college head participates or even leads such discussions so that efforts are coordinated throughout the curriculum, which provides better opportunities for feedback to the instructors.

Other suggestions for improvement included a detailed manual with checklists for the course classification, preferably with examples from every department. Although a simple approach was appreciated, one interviewee suggested that there could be more questions on the classification forms to stimulate deeper reflection, "since our values are formed during our education, and reflection reduces mistakes". One instructor asked for more feedback and opportunities to increase one's holistic awareness. This request could easily be met by discussion in departmental meetings or through information provided to faculty in print. Those who opposed this formal classification system suggested that classification should be done "only when it is relevant, for example, in teacher training programs". Another proposal was that the integration should be limited to discussions with students and colleagues when need arises. In contrast, three instructors pointed to the need to change the culture of the whole organization and to allocate resources to implement real change.

Discussion

The results of the study of the classification forms reveal some interesting differences. It is tempting to explain the predominance of the environmental perspective in the College of Mathematics, Natural and Computer Sciences and the College of Technology and Built Environment with traditionally closer linkages to environmental issues. It does not seem to be very difficult for the faculty members in these departments to relate to environmental issues, which may

stop them from even starting to explore other dimensions of sustainable development, or, at least, to remember it when, for instance, asked about the sustainability content of their courses. Initially, it may also be difficult for them to comprehend the other dimensions. In colleges such as Humanities and Social Sciences; Education and Psychology; and Health Sciences and Sociology, the opposite could be the case. Since the faculty members in these departments are not accustomed to relate their disciplines to environmental issues, they have found other connections to the definitions of sustainable development. This finding is encouraging since it seems to indicate that instructors have reflected on the issue and have identified what could be relevant for their courses. We would definitely consider this as a first necessary step to engage new instructors in the sustainability work.

According to Holt (2003), who has studied the impact of environmental modules for students in business schools, discipline-specific modules appear to benefit students most. Therefore, it is interesting to see that several of the dimensions of sustainability can be integrated into disciplinary-oriented courses within an academic department. Even when the courses with sustainable development content constitute only a minor part in a departmental curriculum, they can act as showcases of how to integrate sustainable development in one or several dimensions.

We agree with Sterling (2004), who claimed that integrating sustainability into "normal" courses and research projects at a university is the best way of reaching the students and equipping them with effective tools and knowledge to work for sustainability in their future careers. In this context, it is encouraging to see that all departments have identified links to their own courses even though it can still be debated how far the various

departments have actually come in furthering integration of the sustainability perspective. It is a fact that the present classification system does not necessarily demand much change, or maybe even none, to allow for a “higher” classification of a course as the classification is based on interpretation by the individual instructors. However, the interviews strongly indicated that several of the instructors have taken the first steps, mentally and/or practically, towards real change.

We did not explore whether the high degree of classification of research projects is due to familiarity with the course classification or if it can be attributed to a perceived increase of the chances of receiving funding from the University, despite the fact that it has been clearly stated that it is not part of the criteria for financing.

As shown by the interviews, the environmental dimension is the most likely starting point for most instructors; but the interviews also indicated that, once the process has started, it can easily develop so as to include additional dimensions of sustainability. The authors believe this development could be enhanced if the procedure would be developed further so that, instead of classifying the courses and projects only according to the level of integration (A - D), instructors and researchers would directly classify and explain what dimensions of sustainable development are relevant for the course or the project. This would also eliminate the present need for interpreting the explanations for the particular classification selected by instructors and researchers. However, also in a more elaborate system, there is likely to be a certain overlap between the various dimensions of sustainability.

One problem with the approach studied arises when having the classification done by someone knowledgeable in environmental matters

is considered more important than having faculty members classifying their own courses. Indeed, the environmental coordinator in each department, with knowledge of the subject area, may be quite capable of making the classification. However, then the instructor’s reflection through the process of thinking through the classification procedure is lost; and consequently the most important trigger for change is at risk of being lost.

It is also evident from comments of interviewees and informal comments from other faculty members that this study, particularly due to the impetus of the interviews, provided a push for the instructors and researchers to reflect on the work of integrating sustainability into teaching and research. The interviews and the study itself became a form of feedback and a sign of interest in their efforts.

It would be interesting to see more studies of similar types of initiatives in other universities so as to evaluate better the potential for promoting the introduction of sustainability into teaching and research efforts and to have a broader basis for suggesting refinement of approaches and initiatives. In our case, the introduction of the classification process was simplified as it was designed to be part of the environmental management system.

Conclusion

Our aim was to study an institutional procedure designed to stimulate integration of the concept of sustainable development into courses and research projects. We gained a number of valuable insights and we recommend this procedure or similar ones to other institutions.

The method of classifying courses provides a framework to approach the issue of sustainable development from common definitions, but still allows for individual interpretations and approaches

to integrating the issues in courses and research. The experience at the University of Gävle clearly shows that it is possible to integrate the concept of sustainable development into higher education in meaningful ways and to address the main dimensions of sustainability – environmental, social, economic and cultural, and their different combinations.

An important finding of the study is that the feedback system needs further development in order to show instructors and researchers that the integration of sustainability is seen as important to the university administration and to promote deep and continuous reflection about course content and research design. The national authorities could support integration of the sustainability concept further by imposing similar requirements in the regular evaluations of all universities by the Swedish National Agency for Higher Education and the research applications for state funding.

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Paper V

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Drivers and Strategies for Education for Sustainable Development

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Paper accepted for presentation at the International Advanced Research Workshop on Higher Education and Sustainable Development, HESD, in Maribor, Slovenia, March 29-30, 2007, with minor editorial revisions made in June 2007.

Key words: Strategy, drivers, education, sustainable development, environmental management system

Abstract

This paper discusses the question of how education for sustainable development (ESD) can be introduced into higher education. It presents results of a survey with replies from 17 Swedish universities. The focus lies on the strategies universities are adopting for ESD, the tools they use for the work, what drivers and barriers they experience, the support they need and how the work could be further developed.

Introduction

In the years 1997 and 2001, Swedish universities, together with other public agencies, received Government directives to start implementing environmental management systems (EMS). The public agencies would act as role models and the Government saw the environmental management systems as a tool to start the development of a more ecologically sustainable society.

Based on the UNECE strategy, the Swedish Higher Education Act (SFS 1992:1434) was in 2006 amended to include the following statement: “universities shall in their activities promote sustainable development, which means that present and future generations are assured a healthy and good environ-

ment, economic and social welfare and equity”. By this a wide concept of sustainability was adopted, including also the economic, social and equity dimensions of sustainable development.

The study shows that all these 17 Swedish universities have an environmental policy and nearly half of them have a policy including sustainable development. Most universities include education and research in the policies and also work with these indirect aspects. They also see tangible results of work with direct environmental aspects such as reduced use of energy, paper and hazardous chemicals.

The study shows that the Government Directive and the recently amended Higher Education Act have little consequence as drivers for sustainable development due to lack of follow-up and feedback from the Ministry of Education and thus provide little reason for university management to act. Colleagues, individuals in the management and external networks create instead the real support and act as important forums for collaboration.

Background

Education on all levels is seen as a key factor to provide knowledge and awareness about sustainable development (SD) and to promote a much needed change in

society at large. UN has declared 2005-2014 the decade of education for sustainable development (ESD) and UNECE has adopted a European strategy for sustainable development (UNESCO, 2002 and UNECE, 2005). In February 2006 the Swedish Government made an amendment to the Higher Education Act, according to which the universities in their activities shall promote sustainable development, which means that present and future generations are assured a healthy and good environment, economic and social welfare and equity (SFS 1992:1434).

In fact, several international initiatives for sustainability in higher education have been taken since the Talloires Declaration in 1990 and many universities have adopted policies to that end. These policies present a vision, but practical tools to operationalise the vision are still largely lacking (Wright, 2004).

Drivers and barriers for education for sustainable development, or challenges, as they often also are called, have been examined in several studies during the last few years. In a 2003 survey, 60% of Swedish universities perceived the Swedish Government directive as the most important external driver for their EMS implementation (Sammalisto & Arvidsson, 2005). When comparing the results of the surveys in 1999 and 2003, the role of the internal drivers, faculty and staff, was reduced from 70% to 55%, the role of students from 50% to 27% and management and board from 60% to 33%. The role of management actually changed from being an important driver to a major barrier due to lack of engagement. This low support from the management can be explained by the fact that the EMS effort proved to take time and to require resources accordingly.

The challenges for engineering education in Delft University of Technology in the Netherlands are summarised

by Mulder & Jansen (2006, pp. 69-73) in the following list:

- Academic culture in general perceives external forces as threatening to the academic freedom.
- Various disciplinary cultures discourage faculty to deal with subjects outside the area of their disciplinary expertise.
- Without right timing a change is impossible if some other change has just been implemented.
- There is a lack of expertise and resources.
- There is a lack of signals from external stakeholders and rewards to champions.

Based on an international network for reorienting teacher education, Hopkins & McKeown (2006, pp. 33-34) add to the list:

- The climate in higher education does not support creativity, innovation, and risk-taking.
- There is a lack of professionals with knowledge about ESD.
- There is a lack of support from local, regional and national level, especially from ministries of education.
- There is a lack of coordination of SD efforts between ministries of environment, education, health, agriculture, etc.

Based on a survey in the UK higher education, Martin, Dawe & Jucker (2006, p. 65) conclude:

- There is a problem of overcrowded curriculum.
- SD is perceived irrelevant among academic staff.
- Limited staff awareness and expertise is prevailing.
- There is a limited institutional drive and commitment for sustainability.

These conclusions point in the same direction and could be summarised in the following sentences. All input from outside can be perceived as a threat to academic freedom in a university and SD is perceived as irrelevant. There are limits set by the disciplinary culture and a lack of knowledge, awareness, expertise and resources. Right timing and support from outside the university, especially ministries of education, is essential, and there needs to be a coordination of the national SD efforts.

An environmental management system (EMS) such as ISO 14001 is used to provide structure to the environmental work in an organisation. It follows the Plan-Do-Check-Act model and includes the steps: management decision, initial review, policy, planning, implementation and operation, checking and management review.

The significant environmental aspects, which result in the environmental impacts of an organisation, are defined based on the results of the initial environmental review, and determine the order of priorities to be worked on within an EMS. A distinction is often made between direct and indirect environmental impacts, as well as direct and indirect environmental aspects, depending on if they can be traced directly to the source. The direct aspects, such as use of hazardous chemicals and energy, result in observable pollution and emissions of CO₂ in the atmosphere. The indirect aspects, for example education of the students, research at a university as well as training of faculty and staff, result in positive or negative indirect impacts due to future actions of those involved.

There are many international studies and good examples of environmental management system (EMS) implementation in universities. Often the direct environmental aspects dominate these efforts. Based on a survey of US and Canadian universities, Herremans et al.

(2000) concluded that reporting the EMS work to the University board (having high level management interest) and/or having a full time staff responsible for the environmental work (resources in time, money and expertise) differentiated environmental leaders from strugglers.

Price (2005, p. 174), who presents the EMS implementation in University of Glamorgan, has summarised, based on the experience from a number of universities, factors that can help universities to become more environmentally proactive to include:

- Active visible support from the senior management;
- Coordination with other universities;
- An appointed leader for the environmental program;
- Need for a “spark” to start the process, for example requirements from legislation, student initiative etc.;
- Appropriate approach to target audiences, for example the faculty.

Clarke (2006, p. 386), who for 15 years studied the EMS in Dalhousie University in Canada, suggests having two environmental polices: one for administrative functions and one for academic functions. She claims this recognises the decision-making structure of universities and consequently allows better implementation.

Aim

By an environmental management systems directive the Swedish Government appointed the public agencies, including 35 public universities, to act as role models in contributing to the long term sustainable development in the society (SOU 1996:112). No certification of the EMS was required, but three universities and part of a fourth were certified according to ISO 14001 by the end of 2005 (Swedish EPA, 2006, p. 70).

Although the directive was expected to lead to immediate action, some universities have still barely started the work with EMS. One reason is the nearly total lack of feedback on the annual environmental reports the universities submit to the Ministry of Education and to the Swedish Environmental Protection Agency (Swedish EPA). According to the annual summary report for all public agencies from Swedish EPA, only 4 of the 35 public universities had received feedback on their work from the Ministry (Swedish EPA, 2006, p. 20).

The aim of this study is to explore what drivers make Swedish universities work with sustainable development (SD), whether they respond to the need for education for sustainable development utilising their environmental management systems (EMS) or if they work with these issues separately, and where the support for the work comes from. It is also interesting to study if previous work with EMS is a way to promote and operationalise SD and education for sustainable development (ESD).

Method

A survey, containing partly yes/no questions, partly open-ended questions was in October 2006 sent to the environmental coordinators and environmental managers in 38 Swedish universities. Seventeen replies were received, corresponding to a 45% response rate. Ten of the replies came from the seventeen larger universities, six from the thirteen smaller universities, one from the seven universities of creative arts and one from a private university. Some of the smaller universities do not have an environmental coordinator at the moment, a fact which may explain the lower rate of response.

The first questions focussed on the results of the EMS work with direct environmental aspects. These were followed by a question whether the

indirect environmental aspects¹⁰ were or were not included in the EMS and the reason for the approach chosen. The next questions inquired whether the university has a policy for SD, and if it incorporates education and research. The following questions concerned what tools are used to work with indirect aspects.

The next set of questions focussed on the drivers and barriers for education and research for SD. After questions about existing or lacking support, open questions about what the Ministry of Education and the own university could do to support the work with SD were presented. The final question searched for suggestions of how the results of efforts for ESD could be evaluated.

The main focus of the work of the environmental coordinators and managers has so far been the environmental dimension of SD, while less effort has been spent on the social, economic and cultural dimensions. However, it was known in advance that today many of the environmental coordinators are also working with the wider SD concept. They were, consequently, chosen since they were assumed to have the best insight into the work with EMS and its connection to ESD, and also based on their large networks at their universities.

¹⁰ Environmental aspects are, according to the definitions of ISO 14001:2004 Standard, divided into "direct" and "indirect" aspects. The direct aspects, for example, the use of hazardous chemicals can be associated directly with the organization's possibility to control and reduce the environmental impact. The indirect aspects, for example, transport services by an external company, or education of students at a university, can to some extent be controlled by the organisation. The environmental impact of indirect environmental aspects can therefore not fully be controlled by the organization. Environmental training of faculty and staff is a "shall" in the implementation of the ISO 14001 standard. Such training may support faculty to include environmental and sustainability issues in education and research.

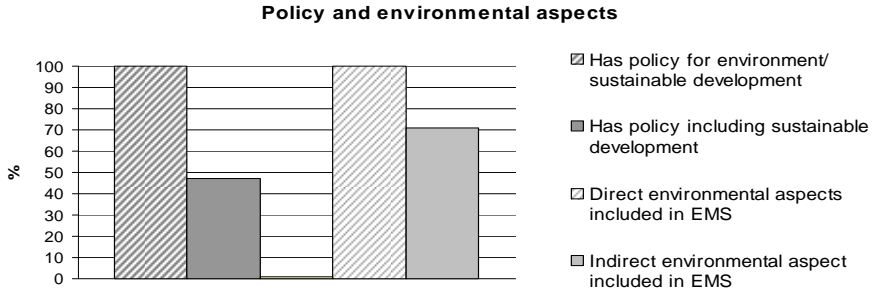


Figure 1: The work with environmental aspects, policy and education for sustainable development in Swedish universities

The replies with the yes/no answers were compiled for statistical presentation. The qualitative open answers were analysed to provide a richer picture of the situation at the Swedish universities. In the final analysis, the results of previous studies and information from colleagues within the area were also used to provide an additional contribution to the discussion.

Results

Nearly half of the policies that all universities report having, include sustainable development. All universities work with direct environmental aspects and 71% of them work also with indirect aspects within their environmental management system. 77% of the universities include education and research in their policy. Figure 1 summarises the statistics.

Improvements in direct environmental aspects

All universities are working with direct environmental aspects. However, one of them has not stated any objectives or targets for the direct environmental aspects. While one university was only in the process of appointing contact persons for the work in different departments, several of them could report considerable outcomes in many areas, for example 100% legal compliance (which is a clear improvement for many universities) and

environmental requirements for procurement and construction projects.

Although most universities do not provide any quantification of the improvements, there are numerous improvements in the direct environmental aspects based on the EMS work, as shown in Figure 2.

A majority of the universities (65%) reports reduced use of energy and (53%) improved waste management with increased recycling. Business travels have been reduced in 36% of the universities. This has been achieved for example by the use of video and computer conferences, and by requiring that all trips in Sweden must be made by train. One university provides free train transport for its students between the campuses and another uses a vehicle run by biogas. The use of paper has been reduced in 29% of the universities. Several of these report reductions of 10% to 30% as compared to 2001.

Other areas of improvement include substitution of hazardous substances by less harmful ones and developing methods in labs that require smaller amounts of chemicals (18%). One university reported cleaning with more environmentally sound cleaning technology, as well as employing an environmental and ethical strategy in investing the university funds.

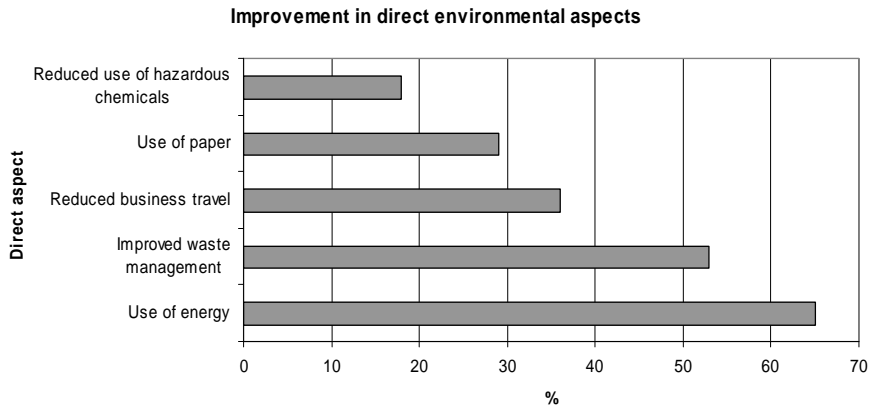


Figure 2: Percentage of universities reporting improvements in various direct environmental aspects.

The university of creative arts wants to see more efficient lighting in TV and film studios, since the presently used lamps have only a 4% rate of efficiency, leaving 96% to undesired heat, which must be removed. They also want to develop artistically acceptable methods, which are at the same time environmentally sound, when using paint, glue, celluloid film and other chemicals.

Indirect aspects

Twelve of the seventeen universities (71%) report that they include indirect environmental impacts in their EMS. However, several of the universities considered training of faculty and staff as an indirect aspect, which, according to the definitions of the ISO 14001 Standard, may be questioned. One university reports having trained 5671 members of its faculty and staff. Three universities reported increased environmental awareness and engagement among their faculty and staff for the work. Three universities say they have objectives for education and training within their EMS, but are actually not working to reach these objectives.

The main reason to work with education and research within the EMS, as reported by ten universities (59%), is the fact that this gives the university the

best chance to make positive impact in the long run. Several of them commented in the following terms: “If the EMS is not connected to the core business, the whole idea of EMS is lost, since the universities educate future decision makers.”

Three out of the five universities that do not include indirect aspects in their EMS provide as a reason the lack of interest and support from the management and those responsible for education and research at the university. One university states the lack of resources as the reason and one that within EMS there is a risk of the environmental dimension dominating and leaving the other sustainability dimensions unnoticed. The work with indirect aspects is also seen to be more difficult than that with the direct aspects. Three universities where education and research were earlier included in the EMS have now excluded it.

Tools to work with ESD

Eight of the universities (47%) report that they have tools to work with ESD, while another eight do not have any. One environmental coordinator does not know about the tools for ESD since it is not connected to their EMS. The tools include objectives and targets for education and research on university level and

in one university the president has given assignments to different departments to effectuate development programs for ESD. Two universities report work with compulsory course classifications for environmental/sustainable development content. These classifications are registered in a course data base. Training of faculty and staff is reported by three universities and workshops and seminars for faculty, staff and students by two universities. One university has connected the work with ESD to the quality assurance system of the university, although they do not provide further details. One environmental coordinator reports that she tries to remind the heads of departments of the work for ESD whenever she gets a chance. Audits within the EMS are also used to interview lecturers, heads of departments and others. One university works on getting the EMS work integrated in the university financial programs and provides financial support to doctoral training and some student projects.

Two universities are in the process of establishing task forces with representatives of lecturers, researchers, students and administrators and tools for the work with ESD, one within and another one outside their EMS.

Drivers and barriers for ESD

Individual lecturers are the most important as *drivers* for seven universities (41%) as seen in Table 1. Six of the universities (36%) report that the amended Higher Education Act is an important *driver* for the work. They also hope this legislation will be so evident in the future appropriation directions to the universities that it will help them and their presidents to focus on core businesses within their EMS.

One reply states that the EMS can provide a forum for the faculty and staff to promote those issues in sustainable development they consider important and

for which they lack another forum. According to the replies basically everyone agrees that ESD is an important part of SD. There have also been lecturers who for a long time have been engaged in the issue due to their conviction. An important driver is also that some research funding is directly connected to SD (in particular the research foundation MISTRA).

According to one university it is easier for some members of the faculty and staff to connect to the wider concept of SD including social, economic and even cultural dimensions rather than the environmental dimension.

Table 1: Important drivers and barriers as reported by universities.

Important drivers	%
Individual lecturers	41
Higher Education Act	36
Important barriers	%
Lack of top management decisions and resources	41
Lack of management support	36
Unclear university organisation	36

The most frequent *barriers* reported, as summarised in Table 1 above, are the lack of top management decisions and resources (41%), lack of management support from the president to the heads of departments and faculties (36%) and the unclear university management organisation (36%). A quote from one reply indicates that, “nothing gets done” if the university management does not demonstrate its engagement and understanding for ESD. The fact that there is no coordination between the university departments and no common structure for the ESD work is also a barrier.

An interesting notion comes from an environmental coordinator who thinks that “we administrators think that it is our management system and we decide about

the objectives and the direction of the system, which results in competition between the EMS and the regular management of the university”. Therefore, it is important, as he sees it, to connect the EMS to the regular decision process for education and research in the university and not vice versa. It is essential to have the same person pushing the change process regardless of if it has to do with the EMS or something else. Other report barriers due to the unclear existing management structure of the university and limited follow-up. As the concept of SD is diffuse, it is difficult to be precise and to work with such issues.

In the university of creative arts the most important barrier is that in case there is a conflict between the environmental and artistic aspects, the artistic aspects are always prioritised.

Table 2: Support and lack of support as reported by universities.

Main source of support	%
Colleagues	77
Network of other environmental coordinators in universities	59
Closest management	35
To some degree university management	24
Main lack of support	%
University management	77

Support for ESD and lack of it

Table 2 shows that the environmental coordinators consider that the main support for the work with SD comes from individual colleagues engaged in SD (77%), from the network for environmental coordinators called MLUH (59%) and the immediate management (35%). Only 24% experience some degree of support from the university management. In one university there is also a centre for SD that provides support. Two of the replies indicate that students are a support

to the work. One comments “there are few who do not support the work for SD, but the general lack of resources limits the work.”

The main lack of support is the passive approach of the university management, as expressed in thirteen (77%) of the replies. This concerns the president, deans and heads of departments, although there are exceptions. As one of the replies quotes from her manager “You should see it so that the university management has great confidence in you as environmental co-ordinator when they do not ask any questions”. She considers, however, this interpretation somewhat exaggerated.

Table 3: Ways to improve work with ESD as reported by 15 environmental coordinators.

National and university level	%
Follow-up and feedback from the Ministry of Education	59
Requirements from the Ministry of Education based on the Higher Education Act	42
Requirements on environmental performance in the EMS system	24
Own university	%
Active and visible management engagement	42
Clearer responsibilities	35
Resources	29

What should be done on national and university levels to make ESD easier?

As presented in Table 3, ten (59%) universities report that if the Ministry of Education provided follow-up and feedback and asked questions to the universities, this would make it easier for them to work for SD. Based on the amendment of the Higher Education Act, 42% of the universities expect some kind of requirements from the Ministry. “Without follow-up, the requirement on EMS and ESD are useless” according to one comment. The university presidents should be informed and trained about the importance of the issues.

24% of the universities look for clearer requirements on EMS results, which would show in the annual reporting as well. What they refer to is the environmental performance and not just with the system structure. The EMS could, as an example, provide reasons to work with the sixteen national Swedish environmental quality goals, to follow them up, to coordinate the efforts to reach them make the efforts more visible. Today only environmentally sound procurement is clearly stated in the EMS requirements. Following the core business, education and research for SD, should be more in focus.

What should your university do to improve the work for SD?

Fifteen of the environmental coordinators or managers answered this question. They provided a wide range of suggestions of how the work for SD could be improved at their universities. The most important would be the active management engagement to make the work more visible (42%), as well as clearer responsibilities (35%), resources (29%), to make SD everyone's responsibility and to provide guidelines. It would also be important to live up to the environmental and SD policies and programs that already exist. For the university of creative arts it would also be important to increase the input from the future employers on the education and to create new ways to work artistically

How could the work with SD be evaluated and made more visible in the future?

The proposed ways to evaluate include surveys among faculty and staff on how they work and among students on what they have learned. According to one reply the aim of education and what should be evaluated is "for the students who will become experts it is important to evaluate their knowledge and for non-expert students their ability to question and evaluate their sphere of activity."

The main effort should be to build up a "feeling" for the work. But the follow-up of the work is essential and for it simple tools and helps are needed. Follow-up could for example be done using indicators created by the MLUH network. They could also be used to compare universities with each other and to allow comparisons between years to identify improvements. Another way to evaluate is by using the AISHE (Auditing Instrument for Sustainability in Higher Education) evaluation tool (DHO, 2007). The most important tool to effectuate change may be evaluation, where the Swedish National Agency for Higher Education with its assessments plays an important role. For research bibliometric tools could be used to assess the number of publications.

Discussion

It is worth noticing that all universities in the study have an environmental policy and that nearly half (47%) of them has a policy that includes sustainable development. Although most universities (77%) include education and research in their policies, they do not all work with these issues in practice. This indicates that policy documents are often not leading to practical action.

Aspects

In practice all universities are working with their *direct* aspects, even the university without any stated objectives or targets. It is interesting to note the many improvements that are reported related to EMS. The level of compliance with legislation and other similar requirements is a direct result of the EMS, since the awareness of legislation has previously been very low in many universities. Legal compliance and easier access to data should result in future savings due to avoidance of problems, while the savings due to reduced use of materials and energy are also becoming more apparent.

For example the University of Gävle reports a 52% reduction of waste handling costs since 2005 (HiG, 2007). Another benefit, not directly reported now, but reported as a barrier earlier, is that the availability of data makes it possible to report improvements (Sammalisto & Arvidsson, 2005).

The work with the *indirect* aspects is a more complicated matter. There is no way of demonstrating the short term results and even in the long run the follow-up is largely based on the actions taken to reduce the indirect impact. To integrate sustainability in education and research is very much dependent on the subject in question and its disciplinary context. Although universities see education and research as the core business of the universities, three of the universities in the survey have chosen not to include them in their EMS. Although these universities do not have a separate policy for ESD as Clarke (2006) suggests, they may end up adopting one to formalise the work and will maybe even adopt goals, action plans etc., which in fact would mean working within an EMS-like structure.

Less than half of the universities reported having *tools* to work with ESD. Many of them include training of faculty and staff as an important indirect tool for the implementation of the EMS work. The ISO 14001 certified universities, indicated that various policy documents are used as tools for ESD. They have introduced classifications of courses and research projects as tools to follow up the integration. These universities also see audits as tools, since management and faculty are interviewed as part of the audit process. In these universities the ongoing work has given EMS legitimacy and created acceptance to develop it further.

Drivers and barriers

The results of this study do not agree with those of Martin et al. (2006) since in

Swedish universities there appears to be no problem with the acceptance of the need for SD, and the roles of faculty and staff and especially the engaged individuals are quite apparent as drivers for ESD. This agrees with the major role the engagement of faculty and staff played also in EMS implementation according to Sammalisto & Arvidsson (2005), although their role as a driver was somewhat clearer in that study (50%), as compared to 41% now.

The Government Directives were considered to be a more important driver with 60% in 2003 compared to the Higher Education Act now (36%). The reason for pointing to the Government Directives and legislation is that they are expected to enhance the importance of such issues in the eyes of the university management. It should be remembered that the most frequently reported barrier for EMS was lack of management support, since the support from the management dropped from 60% in 1999 to 33% in 2003 and was 36% in 2006. Initially the Government Directives were experienced as a mandatory requirement, but without follow-up and sanctions, or even questions and feedback, there is nothing compulsory about it. This confirms the need for external drive and support as presented by Hopkins et al. (2005).

In the present situation there are no carrots that would motivate the university managements to work for ESD as long as students do not ask for it, and provide a market opportunity to attract additional students. But it should be noted that a few engaged students can also stimulate the management to act by their critical reports and actions against passivity at universities.

There are today no additional resources, special support or recognition for those who perform well in this respect. The stick is also very weak due to the lack of follow-up and feedback from

the Ministry of Education, as well as the lack of sanctions for not complying with the Government Directives and the Higher Education Act. This means that management engagement and support for ESD in universities are almost exclusively based on personal interest.

Support

In 1999 the students were important as drivers and supporters for the EMS work. As employment opportunities in the environmental field did not materialise according to the expectations, also the student engagement for environment and SD has decreased. At the same time it appears that the support from colleagues and collegial networks has remained important and maybe even grown in relative importance.

Most studies of management system implementation agree with Price (2005) that the active support from the senior management is fundamental. It is a precondition for resources, but also essential in making the work visible in different contexts by directions and questions, thus creating an institutional drive and commitment (Martin et al., 2006). The study indicates that there is room for improvement in this area, but without support from ministries of education it may be difficult to convince the university management, with few exceptions, about the importance. A start in this direction could be to encourage the managements to establish action plans and try to live up to the existing policy documents (Wright, 2004).

EMS a help for ESD?

It is apparent that the universities which have worked longer and in a more committed way with their EMS, most of them certified according to ISO 14001, also see the possibilities in developing the EMS further towards being a tool to implement ESD. These systems have a structure to make ESD more visible, to

keep the work going with audits and for example course classification for ESD-connection. Also the training of and seminars with faculty can be developed further, applying the academic tradition of discussion and debate with colleagues, which will increase the chances of ESD gaining ground.

It is possible to work with ESD without an EMS, but there seems to be evident advantages in connecting such activities to the EMS and to include the structure for objectives, targets, action plan, audits as follow-up and reporting to make it more visible.

The major problems appear to be the unclarity of university management, the lack of general management system to connect the EMS with and the prevailing decision making processes in the university. Without a follow-up and feedback there is a risk that nothing changes. The follow-up and feedback would in this case need to be from the national level to university managements to departments to faculty and staff. Although there is a certain “allergy” against all kind of control and perceived threats to academic freedom in universities as described by Mulder et al. (2006), the tools could be developed further to accommodate them in this context.

Also the ongoing Bologna process for making the European higher education more comparable between countries provides good opportunities to advance and accommodate ESD. After the adjustments have been made in all countries, it is likely to take a long while before another educational reform with similar opportunities comes back (Mulder et al., 2006).

Conclusions

The results indicate that

- All Swedish universities in the study have an environmental policy and

nearly half of them (47%) have a policy including sustainable development.

- Results of the environmental management system (EMS) work with direct environmental aspects such as use of energy, paper, chemicals, transports and waste handling are tangible in most universities.
- Most universities (77%) include education and research in their policies and are actually working with these issues in their environmental management systems (EMS).
- Internal drivers from engaged faculty and staff are important, whereas the expected compulsory drivers or 'sparks' in the Government Directives and the recently amended Higher Education Act have little consequence due to lack of follow-up and feedback.
- Management has basically no positive motivators for environmental management systems (EMS) and education for sustainable development (ESD). Consequently, their possible active support in creating institutional drive is based on individual engagement, but is today lacking in most universities despite the rhetoric.
- Support from colleagues and external networks is an important forum for collaboration and support.

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Kaisu
Sammalisto

Environmental Management Systems – a Way towards Sustainable Development in Universities

**”It was difficult at first ... then we started talking with our
colleagues and we saw it in a longer perspective”**

The need to achieve sustainable development is a pertinent and global issue. Accordingly, this has raised the question as to what role higher education can play. How can universities, as educators of future decision-makers, provide students the necessary knowledge, understanding and action-competence to meet emerging challenges? As one suggestion, the Swedish Government has appointed public agencies, including most universities, to act as role models to achieve sustainable development in society. Government directives suggest the implementation of an environmental management system (EMS), according to which universities can approach sustainable development. But can environmental management systems act as effective tools to promote integration of sustainable development in universities, including education and research? And how does EMS implementation in universities differ from industry?

This thesis presents an in-depth evaluation study of the effectiveness of the Government EMS Directives in Swedish universities. In the study the assumed process is described in a model and its stages are explored to find *why* and *how* universities work with environmental management systems. Methods of training and communication at a university are described and their results are presented. Through an analysis of how faculty understand sustainability in their courses and research applications, opportunities for education for sustainable development become apparent. The challenge then, is to make sustainability an academic business.

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