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Development and Implementation of an Environmental Management System in Universities

Linda Gustafsson,

Emma Axelsson,

Ebenezer Miezah Kwofie

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Linda Gustafsson, s093003@utb.hb.se

Emma Axelsson, s072945@utb.hb.se

Ebenezer Miezah Kwofie, x090416@utb.hb.se

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Subject: Environmental Management Systems

Högskolan i Borås
Institutionen Ingenjörshögskolan
501 90 BORÅS
Telefon 033-435 4640

Examiner: Roy Andersson

Supervisor, name: Jessica Magnusson, SP

Supervisor, address: SP Sveriges Tekniska Forskningsinstitut
Box 857
501 15 Borås

Job initiator: University of Borås

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Abstract

The role of Universities in building a sustainable society is paramount. It is therefore essential for Universities to adopt and apply tools such as EMS in creating a culture of sustainability which is vital in creating awareness for students as they graduate to fulfil the needs of society.

The purpose of this thesis was to investigate what was required of a University in handling this challenge; to start up and be successful with implementation of an Environmental Management System.

To do this an environmental review has been performed using the University of Borås as a case study. Indirect and direct aspects of the University have been identified and will be evaluated. The result of the review is based on information from interviews, questionnaires and meetings and will serve as the foundation for the University of Borås' further work with EMS.

By comparing four Swedish Universities and their work with EMS, factors to be considered during the development and implementation an EMS have been found. An in depth-interview of key personal together with published and unpublished data from the four Universities have been used for the study. The drivers which prompted the EMS work as well as factors for a successful implementation were identified. Using a prioritization matrix, management commitment, Approach to the process, training and communication have found to be the most important success factors. Other factors worth considering during implementation of EMS in Universities have been found to be duration of the system, timing of success factors, and handling of barriers specific for academia and keeping a simple system.

Using a performance excellence diagram, the different level of commitment to each of the contributing factors for a successful EMS implementation has been established and used in performing a gap- analysis for University of Borås. Based on the outcome of the gap-analysis, appropriate recommendations for EMS work have been given.

Keywords

Environmental Management System, EMS, Environmental Review, Success factors, Drivers, Barriers, University of Borås

Sammanfattning

Universitet och Högskolor spelar en betydande roll i utvecklingen av ett hållbart samhälle. Det är därför viktigt att Universitet och Högskolor använder sig av verktyg, så som miljöledningssystem(MLS), för att skapa en kultur för hållbarhet i sin verksamhet. Detta är av vikt då det skapar medvetna studenter som kan möta det framtida samhällets behov.

Syftet med denna uppsats var att undersöka vad som krävs av Universitet och Högskolor för att klara av denna utmaning; att starta upp och framgångsrikt implementera ett MLS.

För att kunna göra denna undersökning har en miljöutredning utförts åt Högskolan i Borås, som också varit fallstudien för detta projekt. I utredningen kartlades Högskolans direkta och indirekta miljöpåverkan och resultatet skall senare utvärderas. Utredningen bygger på information från intervjuer, enkäter och möten. Resultatet av utredningen skall utgöra grunden för Högskolans framtida MLS.

Genom att jämföra hur fyra svenska Universitet/Högskolor har arbetat med MLS var det möjligt att identifiera faktorer som måste beaktas vid planering och implementering MLS. Denna studie bygger på djup-intervjuer samt publicerat och opublicerat material. Både drivande krafter och framgångsfaktorer identifierades. I en prioriteringsmatris så bestämdes de faktorer som var av störst betydelse för framgång; ledningens engagemang, ansats, utbildning och kommunikation. Andra faktorers som bör beaktas vid implementering av MLS är varaktighet, timing av framgångsfaktorer, vikten av att kunna handskas med barriärer i den akademiska världen och att bygga ett enkelt system för miljöledning.

Utifrån resultatet av denna studie kunde en gap- analys av hur Högskolan i Borås arbetar med MLS idag göras. Utifrån denna gap- analys har Högskolan fått rekommendationer om hur de på ett bra sätt kan gå vidare med sitt arbete med MLS.

List of Acronyms

EMS – Environmental Management System

SD – Sustainable Development

HB – University of Borås

GRI – Global Reporting Initiative

Uni. – University

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1 Introduction

The Swedish National Environmental Objectives make it clear that Universities play a major role in contributing to the sustainable development of society. Therefore, a school for the professions needs to make sustainable development part of the organizational culture. This is important because it creates awareness for students as they graduate to fulfil the needs of society. This can be achieve through the usage of tools, such as an Environmental Management System (EMS), which can positively affect the University's core competence - teaching and research - as well as reduce the negative impact on the environment.

As of today, there are only three Universities and a faculty of a fourth university in Sweden that are both working with an environmental management system and are ISO 14 001 certified (Certification.nu, 2010) This is likely to change since from January this year a governmental ordinance requires Swedish authorities to implement and work according to an Environmental Management System.

Therefore it is of importance to establish what factors needs to be considered for a University to develop and implement an EMS successfully.

1.1 Background

The University of Borås is investigating the current environmental impacts of its operations and find ways of serving the university community and society even better. This is to be achieved by building on the existing environmental structures through an environmental management and while pursuing this agenda, aim at an ISO 14001 certification by June 2011. The starting point for this work is to conduct an environmental review; find out current aspects of its operations and how they impact on the environment. When the current situation is known, then by incorporating the outcome into policies and goals, a formal management system for continuous improvements can be planned and implemented. The overall purpose is to improve positive aspects and minimize any negative environmental impact caused by the University to the barest minimum.

Based on above, The University of Borås wishes to update an old environmental review established in 1999, to include also the aspect of sustainable development. In addition, it's of the University's interest to understand how the ISO 14 001 certified Universities have conducted their work during the planning and implementing of their environmental management systems.

1.2 Purpose

The purpose of an environmental review is to provide the foundation for the proposed EMS and certification. It would highlight the environmental aspects, applicable legislation, what is already in place and learning from other institutions.

To ensure a successful implementation, various factors and critical success factors would be identified in relation to a successful EMS. This would be modeled to incorporate other issues for consideration when developing and implementing EMS in universities.

Based on the result of the review and the success factor model, appropriate recommendation would be given for environmental work at University of Borås.

It is hoped that, the knowledge, understanding and recommendations from this review would ensure that the other key elements of the EMS – policy, objectives and targets and the management programs - are based on a sound understanding of the university's situation and reflect this reality in her attempt to join the ISO 14 001 certified institutions in the very near future.

1.3 Scope and research question

This section outlines the discussion of the current problems with regards to EMS implementation through to the research questions for this project.

1.3.1 Problem discussion

The development and implementation of EMS has mainly been the maintaining of organizational environmental performance inside the requirement of the law. With the introduction of the current government legislature on environment, it is incumbent on institutions not only to understand the exact details of which activities, product and services are affected by the environmental legislation but also to understand how such laws develop and where to monitor such developments on a regular basis.

This calls for a review of institutional activities and services in relation to the environment and would help in the gap analysis to identify possible areas for improvement to meet the environmental baseline requirement. In an attempt to bridge this environmental gap what have been the experiences of other Universities who have gone past University of Borås in this area with planning, implementing and now are working with the maintenance of their environmental management system. Are there lessons to be learnt? Are there pitfalls to avoid?

1.3.2 Scope

The scope of this thesis is to find the environmental impact of a University. This will be done by update a previous environmental review of University of Borås. By comparing the previous work in development and implementation of EMS of four Swedish universities drivers, key success factors and barriers for EMS in higher academic institution would be identified.

1.3.3 Research Question

Main question:

> ***What is required to start up and be successful with implementation of an EMS in a University?***

Sub questions

> ***A. How does a University impact the environment? (Case study of University of Borås)***

B. What are the success factors for a Swedish University when implementing the EMS?

C. What combination of success factors gives the desired result? (different factors and the levels of commitment to each factor)

D. What is the way forward for University of Borås?

1.4 Limitations

The comparison has been limited to only four Universities in Sweden and in doing so only key personnel involved in the initial stages of EMS development and implementation at various universities were granted interview.

With respect to the review, the investigation only takes into account University of Borås and its facilities, not including Campus Varberg. Both direct and indirect aspects are considered but not working environment. Student union environmental works are also not included. The students' environmental impact has not been considered, only in relation to the indirect aspects of education and research.

2 Analytic framework

In this chapter the analytic framework for this thesis is presented.

2.1 Environmental Management System

Environmental management system (EMS) in a broader sense may mean to manage the environment, in this context however, it concentrate on the indirect but nonetheless effective, route of managing an organization's activities that give rise to impacts upon the environment. The interaction between the organization and her environment becomes the focus of the environmental work other than the fluid interface existing between them (Sheldon & Yoxon, 2002).

According to Sammalisto, (2007) standardized EMS are designed not only to increase efficiency of operation or focus on customer requirement but also to facilitate communication between the organization and interested parties directly or indirectly involved in the organization's activities.

In recent years EMS has extended beyond the industries to the public sector including universities but this does not necessarily lead to certification (Sammalisto, 2007).

Universities around the globe have worked in different approaches with EMS. This differs from a formal certified model to informal uncertified ones with a varied focus of environmental interactions, ranging from direct significant aspects to indirect research and education (Clarke & Kouri, 2009). Among these are ISO 14001, EMAS, EMS self-Assessment Checklist, Higher Education 21, auditing Instrument for sustainability in Higher Education, Osnabruck University model and the sustainable University model (Clarke and Kouri, 2007). The recommended template, given by the Swedish government, for EMS in Universities is ISO 14 001 (SFS 2009:907).

2.2 Swedish Governmental EMS directives

According to the Swedish Ministry of Environment, public authorizes play an important part in the transition of making society more sustainable by considering the environment (Miljödepartementet, 2009). To encourage this, the Swedish government has since 1996, given annual directives stating that public authorities are to integrate the fundamental parts of an EMS in everyday activities of the organizations. For appointed authorities, this incorporation has to deal with issues such as; recognition of significant environmental aspects, establishment of an environmental policy and setting up of relevant objectives for improvement. Since the initial stage of this scheme, different public authorities have yearly been elected and assigned to start working with EMS. Each annual group of authorities has been named "miljöledare" (environmental leaders) of the year. Amongst these appointed authorities covered by the directives are 35 Swedish universities.

The EMS described in the directives was a simplified version of the system required for achieving an ISO 14 001 certification. ISO 14 001 has from the start been the recommended template but to achieve a third party certification has not been compulsory (Sammalisto, 2007).

From the 1st January 2010 the governmental directives has become stricter. The new ordinance requires that all public authorities shall implement an EMS that integrates environmental consideration into the organization (Miljödepartementet, 2009). It is stated in the ordinance that both direct and indirect aspects of public authorities' activities shall be considered. If the authority causes a significant environmental effect it should be ISO 14 001 certified or EMAS registered (SFS 2009:907). The ordinance also provides guidelines for how public authorities shall report their environmental work. It is the responsibility of the Swedish Environmental Protection Agency to provide supportive directives for environmental management and also to annually report the result of the authorities work with EMS (Miljödepartementet, 2009).

As of today, there are about 200 Swedish public authorities having an implemented EMS to reduce their environmental effects on society (Naturvårdsverket, 2010).

2.2.1 EMS performance reporting for Swedish authorities

Swedish authorities have been requested to annually provide an environmental accounting report to the Ministry of Environment and the Swedish Environmental Protection Agency. The function of this reporting system is to make follow up on the progress of EMS work in authorities (Sammalisto, 2007).

The 2009 guidelines for reporting the result is a modification compared to previous guidelines. The questions still focus on the fundamental parts of the EMS but also include questions in regards to actual environmental effects. The environmental effects incorporated are; business travel and other fuel consumption, energy usage and environmental requirement in procurement. By visualizing the environmental effects the aim is to focus on the actual follow up mechanism of the EMS which will encourage the authorities to concentrate on improving their environmental performance. For next year's reporting the environmental effects and the fundamental parts of EMS will be of equal importance.

The report also includes an evaluation of how far the different authorities have come in implementing and working with EMS. The authorities are rated in this list based on how many points they have received for their efforts. The evaluation is not qualitative (Naturvårdsverkets rapport 6352, 2010).

2.3 ISO 14 001

ISO 14 001 is an international standard which form part of the ISO 14000 series which was published in 2004 (SS-EN ISO 14 001:2004). It provides the requirements for environmental management systems which enables the development and implementation of a policy and objectives, which considers legal requirements and information about significant environmental aspects and covers six areas; Environmental Policy, Planning, Implementation and Operation, Checking, and Management Review. It is based on a process approach of a system with emphasis on improving environmental protection using a single EMS across all the functions of the organization (Edwards, 2004).

Components of ISO 14001 has been adopted and implemented in many universities either through a formal or informal EMS

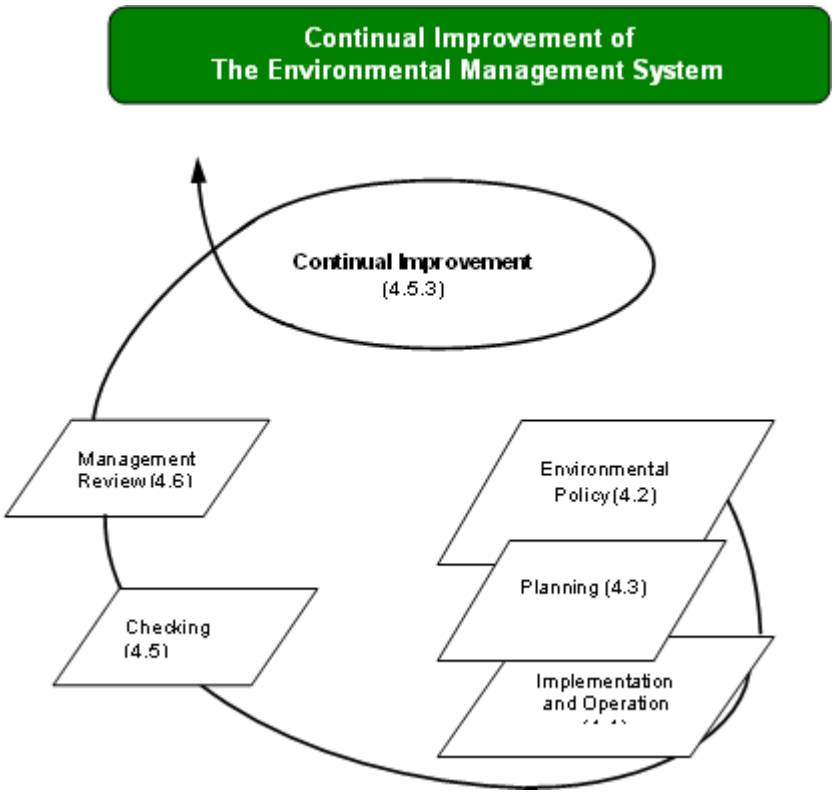

Figure 2-1: ISO 14001 Model (source SS-EN ISO 14 001:2004)

2.3.1 The Environment Review

The core element of ISO 14 001 standard is continuous improvement. To enable improvement the present situation needs to be established, and this is done by performing an environmental review. The review shall identify any environmental aspects of an organizations activities, products or services, present and future, within its control and influence. The aspects that are highlighted as significant shall be taken into consideration when building up, implementing and maintaining an EMS. The result of the findings shall be kept up to date and documented (SS-EN ISO 14 001:2004).

The governmental EMS directive's requirement of the environmental review is similar. It states that the environmental impact caused by the public authority's internal and external activities shall be investigated and presented in an environmental review. The review shall be kept up to date by being reviewed if the authority's operation changes essentially or at least every fifth year. It shall also contain environmental legal requirements relevant for the authority. The result of the review shall be the foundation for the frame and the focus of the EMS. The directives also state that if the authority has a simplified EMS but the result of review indicates that the indirect environmental impact of its activities is significant, the EMS shall include these aspects (SFS 2009:907).

2.4 Drivers and Success factors for EMS in an academic institution

This section describes the drivers which have prompted the implementation of EMS in academic institutions and also the factors necessary for consideration in building an EMS in universities.

2.4.1 Drivers

Drivers for EMS implementation according to Clarke and Kouri, (2009) have been defined as 'what prompt an organization to undertake environmental action'. It is mentioned that though it differs from those of businesses in the sense that, key drivers for EMS in a University are not due to external forces such as diligence or market influence; rather responsibilities for the environment, health and safety have influence it.

Clark & Kouri (2009) also discusses the pressure of change from internal parties; this subject is also discussed by Sammalisto (2007). Sammalisto discuss the importance of the management in a University to create institutional drive and change of culture in a University.

According to Brorson & Almgren (2007), Cost reduction is a driver since the organization can set goals for example reduces the energy consumption and the implement a better waste management system to reduce the costs for the organization.

Other drivers is creation of environmental awareness amongst the staff members and students, market benefits since the EMS can reduce the negative publications due to environmental impact. The demands from the government are a driving force to implement EMS into organizations in Sweden. (Brorson and Larsson, 2006)

The government directive can be seen as a weak driving force in Swedish Universities since only 60 percent of the Universities see this as an important part of the EMS. As a result of this the outcome of the directive is imitated (Sammalisto, 2007).

2.4.2 Success Factors

There are different success factors during the three major stages – before, during and after implementation - to gain and maintain an ISO 14001 certification. Issues such as taking the decision for a certification, forming environmental council, performing an environmental review and finding a good environmental coordinator are success factors worth considering before the implementation of the EMS.

During the implementation stage it is important to have good communication between the project group and the management, training management and personnel, to get the discussion regarding SD and other environmental issues started and to share knowledge and experience among the different environmental representatives.

After the organization has received their ISO 14001 certification it is important to have a person in charge for the maintenance of the EMS, to renew and follow up the goals, policy and review and to keep on communicate the benefits of the EMS to staff and students. It is also important to keep the organization updated on issues of environmental legislation.

Some factors are important in all three stages of the EMS - having the proper resources for all the three stages and communicating and getting feedback on the progress of the EMS (Sammalisto, 2007).

2.5 Barriers in academic institution

Working with EMS in industry has generated some interested results however it has not reflected much in the academic sector. Peter Viebahn, in 2000 attributed the low patronage to these three reasons:

Firstly, issues concerning safety have dominated environmental protection measures in higher education as a result of the lack of legal regulations for economizing measures. Therefore, measures such as saving energy and water, reducing traffic, environmentally friendly methods of construction, nature protection which relates to ecological use of resources are carried out on a voluntary basis.

Secondly, unlike the market economy and other public institution where the organizational structure is hierarchical, the universities still operate it organizational structure with the feeling of responsibility lacking. Hence, tools that have proven to be workable in the market economy could not be applied to the higher education sector, and resource-saving measures could not be implemented via central regulations.

Finally, there are incentives within the market economies with the aim of encouraging staff to use resources carefully, but this is practically absent in the higher education sector as a result of an unfavourable financial system, and perhaps a lack of productivity orientation.

3 Research methodology and Methods

This chapter describes the methods for collecting and analyzing data. It also discusses the difficulty of their usage, the reliability of their results as well as the work flow in applying the methods for this project.

3.1 Methodology

In 1996 there was government ordnance to encourage public institutions to work with environmental management systems. Different public institutions including universities have developed ways of doing this. This study was based on the experiences gained from four universities in mid and western Sweden that have been working with EMS. Out of these four Universities, two are ISO 14 001 certified with also one of these also EMAS registered. The other two Universities have done an environmental review and started working with implementation of EMS but not gone as far as certification.

The majority of the information was obtained through interview of key persons who have been involved in the initial process and are still working with EMS either in the same institution or other organization. Published and unpublished documents (including old files, annual environmental report, environmental report, environmental statistics, etc.) from these institutions were also used during data collection.

In relation to the environmental review, a structured questionnaire covering personal and business travel, and energy usage was prepared to establish the extent of impact of these aspects at an individual level. Since the result of these surveys is not presented as part of the overall result in the report, no detailed method will be presented in this chapter. For more information see sections 1.3 and 17.2 for method and work flow, and discussion of method respectively in the environmental review (Annex I).

3.2 Methods

The methods for qualitative research have been adopted for the thesis. Qualitative research is a type of scientific research which consist of an investigation that: (a) seeks answers to a question, (b) systematically uses a predefined set of procedures to answer the question, (c) collects evidence, (d) produces findings that are applicable beyond the immediate boundaries of study (Mack et al, 2005)

For the purpose of this work, in-depth interview, which are optimal for collecting data on individual perspective and experience with EMS implementation have been used. The result of the interviews was than analyzed according to the model below:

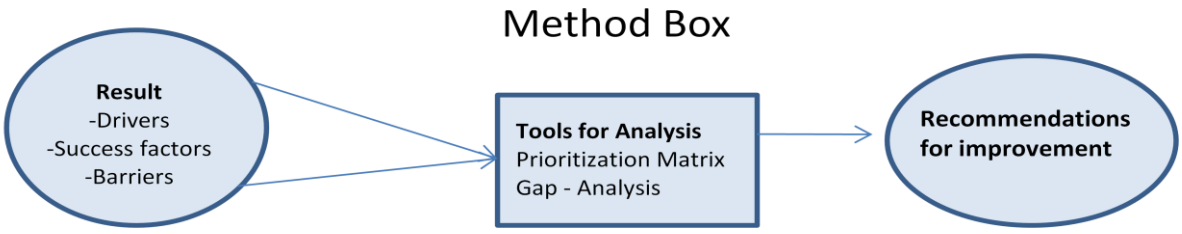

Figure 3-1: Work flow for methods

3.2.1 Prioritization matrix

This is a qualitative tool used to sort a list of items in order of importance. To prioritize the drivers and success factors in the result of this thesis work a prioritization matrix has been used. It is one of the seven management tools. It is used for example to prioritize tasks, issues and product characteristics. It can also be used to make decisions. The prioritization matrix is often used when the key problem is known, but the options for solving the problem needs to be narrowed and you have limited time/founding/resources for implementation of solutions or a system (Brassard, M 1996).

3.2.2 Gap-analysis

The gap-analysis can be used to find and close the gaps between the organizations needs and what the organization can achieve. It can also be used to see how rational the objectives in a project are (Westwood, J 2006)

4 Results

This chapter deals with a summary of result obtained from the environmental review as well as a report of how far the four Universities under review have been working the various aspects of the EMS.

4.1 Environmental Review for University of Borås

The result of the environmental review is an investigation of the different activities of University which have an impact on the environment. It consist of four main parts; a general description of the University of Borås and her current environmental management, identification of different aspects the University's operation, evaluation of identified aspects and compliance to laws - presented as a law list. (Refer to annex I).

4.1.1 Identification of aspects

The direct aspects that have been identified are:

1. Facilities and plans for new buildings and renovations
2. Training
3. Purchase
4. Emergency plans
5. Chemical usage
6. Transportation; Personal transports and Business travel
7. Waste management
8. Usage of raw materials and natural resources
9. Emission to environment
10. Other local aspects

The indirect aspects that have been identified are:

1. Education and research
2. Cooperation with society

Recommendations for improvement have been given as comments in regards to most of the aspects.

4.1.2 Compliance to laws

For a complete review a list of laws with its requirement was put together. The structure and components of the list is built up according to requirements of the ISO 14 001 standard. In the current list all laws and other regulations that can be of relevance for the University are listed and shortly described.

As recommendation from ISO 14 001 determining how legal requirements apply to an organization significant aspects can be established during the requirement identification process. For the purpose of the future running of the EMS it is beneficial that knowledge of relevant regulations and how these regulations apply to the University of Borås' different activities is gained and kept in house by involved key personal.

Based on above the list of laws will be completed by involved people at the University during the summer 2010. This work will include improving the list in certain areas. It needs to be made completely current. It is also very importance to relate the laws to the everyday activities of the University and considerations have to be made in regards to how to secure compliance to relevant laws.

4.1.3 Evaluation of Aspects

By evaluating the identified aspects the order of significance are determined. This evaluation will be done by a rating according to a valuation- and prioritization model. The factors to be considered include; the extent of environmental impact, the severity of the environmental impact, the duration of environmental impact, the likelihood of the impact to happen, the University possibility to control and potential to make changes, legislative demands, market- and other demands as well as the society's environmental outlook. For the purpose of the evaluation, a connection between the identified environmental aspects and the 16 Swedish environmental objectives has been established for consideration.

This rating will be done in June 2010 (outside the time frame for this project) by personnel who will be involved in the building and maintaining the EMS together with the authors. This is to encourage involvement and awareness of the findings in the review.

4.2 How the different Universities have been working with EMS

In this section, the authors have presented a brief description of the various Universities and the results obtained from each. This includes the drivers which prompted the EMS work, the success factors and the main barriers encountered in the process of development and implementation.

With the keen interest of affecting society through sustainable development practice, different approaches have been adopted to integrate sustainable development in courses. The section concludes with results of how the different schools have worked with this SD integration.

4.2.1 Universities Description

The universities under study for this work have been name A, B, C and D. Below is a brief description of them and how they have worked with EMS.

- **University A**

  The University have 12 000 registered students and offers approximately 40 degree programs and 1000 elective courses. The organisation is managed by 700 employees and comprise of six institutions (Liljeroth V, 2009).

  In accordance to governmental directives in 1997 the University has annually reported their progress with implementation of EMS. An environmental review was performed in 1999. In December 2001 it was decided by the board of the University that an EMS was to be implemented with the aim of achieving an ISO 14 001 certification (Miljöutredning, 2002). The old environmental review was updated in 2001/2002 followed by gradual planning and implementation measures. The University attained its certification in July 2004 (Dahlström S, 2010a).

In the beginning of 2010 Uni. A reported their EMS performance to the Ministry of Environment and the Swedish Environmental Protection Agency. The University was given 12 points out of maximum 12 points (Naturvårdsverkets rapport 6352, 2010).

- **University B**

  The University have approximately 37 000 students. The organisation has more than 5000 employees and comprise of about 44 institutions and 9 faculties (Informationsenheten, 2010). The University offers more than 150 degree programs and 2500 elective courses (Lindholm, 2010).

  In 1998, in accordance to governmental directives given 1997, the University started working with implementation of an EMS striving for a sustainable society. In February 2000 it was decided by the board that the aim was receive an ISO 14 001 certificate. During 2004 the first faculties and departments received individual certificates. The certification for the whole University was attained in January 2006. While receiving the certification the University also achieved an EMAS registration (Informationsenheten, 2009).

  In the beginning of 2010 Uni. B reported their EMS performance to the Ministry of Environment and the Swedish Environmental Protection Agency and had 12 points out of maximum 12 points (Naturvårdsverkets rapport 6352, 2010).

- **University C**

  The University have 14 500 students and offers approximately 50 degree programs and 500 elective courses. The organisation has about 500 employees and comprise of five sections/institutions (Om Högskolan C, 2010).

  In accordance to governmental directives from 1996 and onwards, the University started with the initial phase of building up an EMS in year 2000, by doing an environmental review (Miljöutredning, 2001). The intention was to develop and implement an EMS based on the directives description of an EMS, which was simplified compared to the requirements of the ISO 14 001 (Kjeang, 2010). As of today, the EMS at the University has not been ISO 14 001 certified.

  In the beginning of 2010 when Uni. C was to report their EMS performance to the Ministry of Environment and the Swedish Environmental Protection Agency, they failed to provide any information (Naturvårdsverkets rapport 6352, 2010).

- **University D**

  The University have 15 000 students and offers approximately 65 degree programs and 800[1] elective courses. The organisation has about 650 employees and comprise of six institutions (Om Högskolan D, 2010).

[1] The number of programs and courses has been calculated based on information given from each academic institution at the University.

In accordance to governmental directives from 1996 and onwards, the University started with the initial phase of building up an EMS. An environmental review was performed and later updated in 1999. Shortly afterwards, the University carried out an extensive work in regards to preparing routines, in relation to significant aspects highlighted in the review, for EMS implementation (Magnusson, 1999). The aim of this project was to achieve an ISO 14 001 certification by the end of 2001 (Magnusson, (2000/2001). As of today, the fundamental parts of the existing EMS at the University have not been certified.

In the beginning of 2010 Uni. D reported their EMS performance to the Ministry of Environment and the Swedish Environmental Protection Agency. The University was given 7 points out of maximum 12 points (Naturvårdsverkets rapport 6352, 2010).

4.2.2 Drivers for working with EMS

In an interaction with the different universities, the drivers which prompted the initiation of environmental work have basically been analogous. However, different emphases were place on the drivers which brought about different level of commitment to the whole process. In the table below the authors have rated these drivers according to how much value has been placed on it:

Table 4-1: Drivers for EMS in four universities

DRIVERS	UNIVERSITY			
	UNI A	UNI B	UNI C	UNI D
Government encouragement to work the EMS				
The thought of sustainability (SD)				
Educational responsibility (Being role models)				
Due diligence and Compliance				
Cost Savings (Long term pay-off)				

High Average Low

4.2.3 Barriers

A look at University EMS implementation barriers during this work revealed that they were basically the same among the different universities as those listed above in section 2.5. In addition to these a different perspective of academic and administrative staff about EMS has contributed immensely to the malfunctioning or otherwise of the EMS during and after the implementation process.

For instance, academic teachers had seen themselves as guest in hotel rooms and so they are at liberty to do what please them, all in the name of academic freedom. But that in itself is a

misconception because in the institutions exist management, government regulation and above all the sustainability of society (Dahlström, 2010b). Again, the lecturers, being professionals in their various fields have the difficulty stepping out of their comfort zones (Andersson, 2010).

Administrators, on the other hand, are of the view that they have little or no influence when it comes to sustainable development. This is because they do not directly influence the core business of the institution – teaching and research – and so a target of a sustainable society by the University should focus on teachers who interact on a daily bases with the students or better still they, the administrators, cannot affect the results of sustainable development from their office (Andersson, 2010).

The effect of this different perspective by teachers and administrators in universities reflected in the performance of the system. The difficulty in establishing common grounds for mutual cooperation between administrators and faculty members was evident among the different universities.

In another scenario, where a professor was at the forefront at one faculty in Uni. B, he had most of the needed resources and more importantly the support of his colleagues (Andersson, 2010). Universities who had administrators or faculty members other than professors or PhD holders to man the affairs of the EMS had this adamant behavior of teachers (Samalisto, 2010) as has been the case in Uni. C and D.

4.2.4 Success factors for EMS implementation in Universities

The identified success factors when building up an EMS have been used in different ways at the four Universities under review. In this section the authors present how it differs among the universities.

- **Management commitment**

  Management commitment has been identified as the one of the most important factors for a successful EMS implementation (Sambasivan and Fei, 2008). It reveals management involvement in the entire process and includes setting up environmental policy as well as objectives and targets and also a regular review.

  In Uni. A, the president had appointed a dean for Environmental Management to oversee and coordinate process for implementation of ISO 14001. The university's Management had received frequently progress report of the different activities which led to a regular EMS discussion at the initiative of the Dean for Environmental Management. The Management also undertook an organised training about the basics of EMS and experiences from the implementation of the system at another University. To further demonstrate their commitment they also participated in the general training for faculty and staff members (Sammalisto and Brorson, 2008).

  The management at University B was very committed in the initial stages of EMS implementation. The University had a change of Rector in 1998, and during his first public appearance, in front of the Deans and other interested parties, he talked about introducing EMS at the University as well as explaining what it would incorporate. The rector was also very interested in SD issues and therefore he mentioned the importance of SD at all public appearances. Occasionally he also participated in smaller conferences

talking about EMS and implementation difficulties (Olausson and Roos, 2008). In 2004, when the University had a change of Rector, some faculties and departments had achieved certification. The management commitment was clearly demonstrated and visualized by published pictures of the new Rector receiving the ISO 14 001 certificate. The management commitment was by these actions sustained during ongoing EMS implementation process (Andersson, 2010).

Uni. C's intention was to build a simplified system. At that time, environmental issues were not on top of the agenda for the Rector of the University. The Rector did not communicate the EMS introduction to the rest of the organisation which made it obvious that EMS had a lower priority than other matters. Other personnel other than the Rector dealing with all important matters in regards to the EMS also reflected the level of commitment (Kjeang, 2010).

At Uni. D an environmental policy and an action plan for environmental issues was developed by a project group in 1997. The University board established the policy and the action plan, for a trial period of two years, in 1997. The policy and a new project plan for EMS implantation were determined in 1999 (Magnusson, 1999). Achieving an ISO 14 001 certification for environmental management was only discussed in informal meetings with the environmental coordinator and directly involved people. The distinguish feature of the level of management commitment at University D is that produced material for development and implementation of EMS are not given authority approval, to enable real progress (Magnusson, 2000/2001).

- **Resources**

Resources in terms of finance and personnel have always been relevant for projects of such nature. Even though the authors did not have information on how much was invested in the process at all the universities, it has been establish that Uni. B had an in 1998 200,000 kroner to start the process. This amount was doubled the following year and quadrupled the year after. Uni. B currently has an annual budget of 2.6 million SEK for their environmental work. In one other faculty with about 2000 employees in Uni. B, an EMS project worth 1.5 million SEK was approved in 2003. The investment has proven it worth and now that faculty is the best in environmental work at the University with an annual budget of 1.6 million SEK. This has reflected in the attitude of students since SD integration into daily work has been a student requirement (Andersson, 2010).

Personnel availability in terms of number of people and the time they work with EMS has also influenced the success of the work. In Uni. A, a Dean for Environmental Management was appointed on a half time bases together with departmental coordinators who also worked 5 percent of their time with implementation issues. For maintenance purposes there is today an administrator to work half time with the system (Sammalisto, 2010). Uni. D, also had key person working 25 percent while departmental representative worked 10 percent on EMS (Magnusson, 2010). In Uni. C the environmental coordinator had 25 percent to work with the EMS, the people in the environmental committee only had some few hours for their work with the system (Kjeang, 2010).

- **Environmental Coordinators**

At all the four Universities that were interviewed the environmental coordinators have all been passionate, but there is some few differences between the Universities. At Uni. it was the vice president that took the environmental coordinator role at the University. She was very concerned with EMS issues and got her PhD in the subject along side with the building and implementation of the system (Sammalisto, 2010).

Uni. B started with what they called a "dot-list", mandating all of their 90 departments to have representatives who would spearhead their environmental work and later had an environmental coordinator for each faculty. In 2004 department for environment was established to coordinate the environmental work for the whole University. In all these emphasis were laid on finding the 'passion soul' (Andersson, 2010).

In Uni. C a former energy adviser who joined the staff had been appointed as the environmental coordinator. On his part, his experience with energy and environment had granted him the passion to ensure a suitable EMS was built for the University (Kjeang, 2010).

In Uni. D the first environmental coordinator, a former student of the university had demonstrated her commitment to building a complete EMS. This was evident in the success gained in the early years (Magnusson, 1999).

- **Training**

This involves a planned process aimed at modifying attitude, knowledge or skill behaviour through a learning experience to achieve effective performance in implementation process. This is usually the different processes adopted for creating awareness among faculty and staff in Universities (Sheldon & Yoxon, 2002).

University A had adopted a departmental level for the training of their faculty and staff. This was done to allow for modification to suit the departmental character. However, it was ensured that the main ingredients of the content were not lost. In addition to an introduction to environmental /sustainable issues, and EMS, an interactive exercise (space ship) was introduced. New employees and students received packages of the EMS and the relevant policies and procedures during introduction at their various departments (Sammalisto and Brorson, 2008).

In Uni. B, seminars had been organized for the teachers to create awareness regarding the environmental issues, as well as training in conducting an environmental review at the faculty level (Olausson and Roos, 2008).

In Uni. C, a competition for ideas about SD integration into courses was introduced. If a good idea was conceived, some hours were given to develop and integrate it into the courses. This competition was their way of starting the discussion about SD related issues and how to integrate them into courses. Guest speakers were also invited to encourage the teachers with incorporating SD in their field of subjects but education for teachers was not developed in the start of the EMS (Kjeang, 2010).

In Uni. D there was no proper education regarding the EMS for the staff members. However, the University provided some training days in the spring of 2001, to perk up the awareness regarding the environmental issues amongst the employees (Magnusson, 1999).

- **Communication**

Communication refers to the different ways in which the university community have been informed about the progress of the environmental work both internal and externally.

Uni A has used several channels for their communication. These include internal and public websites, information booklets, reporting at departmental meetings and other meetings. A draft document about environmental policy, targets and objectives was posted for consultation and inputs on the website (Sammalisto and Brorson, 2008).

Uni. B had used many different channels to communicate within their organization. This included reporting at meetings, and public and internal webpage's. The environmental manual had been used to collect information, such as policy, routines and list of laws. This can be found on their webpage. Internal papers had also been used to communicate their EMS and its progress. Introductory lecture to students at the beginning of their programme on EMS had also been used as a communication channel (Andersson, 2010).

The distinguish feature of commitment at University D is that prepared material for development and implementation of EMS did not received authoritative approval and therefore not properly communicated (Environmental Manual, 2000 -2001).

- **Competence for System Building and Maintenance**

The development and implementation of EMS in universities in most cases have been successful when the necessary ingredients identified are in place; however, the inability to sustain the interest of all parties has seen the decline and in some cases the total collapse of the system.

Sharing their experiences, the contact persons at the different universities indicated that; it is not enough just bringing in an expert to help build the system because in his/her absence the system may not function as its suppose to. In Uni. A, the key personnel involved were an expert in the area and had implemented the system in some industries. So with the experience gain couple with her position as the Dean for EMS it was easier for the implementation to succeed (Sammalisto, 2010). Again, in the course of the process, an administrative coordinator was appointed to work with the system on full time basis (Dahlström 2010b). Uni. C on the hand had her environmental review done by a consultant working on a project for a short period. However, his absence the competence of the findings was gone. This among other factors led to the building of an incomplete system (Kjeang, 2010).

The success chalked at Uni. D during the initial stages of environmental work was largely due to the expertise of the key personnel. Data gathered from old files had revealed that their performance with EMS had gained recognition and ranked 8th among early institutions working with EMS. However, like many others, her absence created a vacuum and this led to the dormancy of the system (Environmental Manual, 2000/2001).

Unlike the others, Uni. B had equipped their departmental coordinators to fully handle the process through to certification with the support of the central team (Andersson, 2010).

- **Approach**

In 1997, University B formed an environmental group with the assignment to gain organisational approval for environmental issues (Olausson and Roos, 2008). Due to it large size had adopted a departmental bottom up approach to the implementation process by encouraging them to build the system within the department with the aim of reaching certification while receiving support from the University overall environmental team (Andersson, 2010). In 2000 the University also adopted the top down approach; meaning that the Rector pursuing EMS issues with involvement of Deans and Prefects (Olausson and Roos, 2008). To achieve the departmental approach, a 'dot-list' system was introduced where all 90 departments started with red dots. On the appointment of an environmental coordinator and conducting an environmental review the first two green dots were received. Another dot was earned with the setting of departmental goals. The list ended with a star after certification. After 4 departments had their certification, the competition was raised to a faculty level and now the University as a body is ISO 14001 certified as well as EMAS registered.

In the three other Universities their approaches were similar; the EMS was implemented at the university level with all departments involved as one unit. No form of competitions was adopted in regards to EMS implementation. However, Uni. C some sort had competition for SD integration into courses.

Uni. A, at the implementation stage of their EMS put together a project team which included the Dean for Environmental Management, two lecturers experienced in supervising environmental management and auditing students in companies as well as a representative from industry. The others were a representative from procurement and service department as well as student's Environmental committee representative. Again, an Environmental council was formed in 2002 to provide support for departmental environmental activities. This council chaired by the Dean of Environmental Management consisted of departmental environmental coordinators, members of the project team and student representatives (Sammalisto and Brorson, 2008).

For Uni. C the head of their environmental committee was the vice president of the University. In this group there were eight people, some teachers and administrative persons. The committee had a responsibility to lead the university environmental work (Kjeang, 2010).

Uni. D in 1999 established an environmental council consisting of an environmental coordinator at the University and environmental representatives at each institution. The council's assignment was to lead the way in achieving a certification (Magnusson, (1999).

4.2.5 Sustainable Development integration into Teaching and research

As academic institutions the different universities find the integration of sustainable development in the courses in the different programmes very important. However, the approach to achieve this was different and this reflected in their results achieved so far by the

schools. The difficulty for teachers was finding the link between their subjects and sustainable development and this was pointed out in all the interviews. Therefore, for the success of this work, it is important to create a platform for discussion to make this process quite easier.

In Uni. A, a continuous review of all education programmes and courses for their coverage of environmental and sustainability issues was initiated. Educational programmes that included environmental and sustainability aspects had increased by 34 percent two years after certification. Again, emphasis had been place on content of research and 85 percent of application for research funding were assessed for environmental and sustainability aspects (Sammalisto and Brorson, 2008).

Courses have been marked according to the level of SD integration at Uni. B. courses with less than 50 percent of SD were marked partly green otherwise they marked completely green. If courses had nothing to do with SD, they were left unmarked. As of the time of this report, 10 percent of total courses and programs offered were partly green while 20 percent were fully green. In a survey conducted about student awareness and whether their choice of courses at the university had been influenced by the greening of the courses, 20 percent indicated their awareness and 10 percent had chosen their respective courses as a result of SD integration. The focus now is to get more course to integrate SD, however, as more courses get greener the criteria gets tighter (Andersson, 2010).

It is interesting; to know how SD has been integrated into the teaching of languages in Uni. B. SD has been introduced into the discussion about how the languages are changing. Example new subjects that comes in to Swedish, Dutch or German, that requires the building of new languages, new words, new definitions, and so on give way for discussion about how SD as an example develop in the such countries, and how are they forming these words to give a clear global perspective. This is relevant because when the new thing comes in to society it is not discussed and explained in the same way in two different languages (Andersson, 2010).

Uni. C brought in help from another University in Sweden to help them out with the investigation regarding how much SD was integrated into their courses. This was the ground foundation for their further work with integration of SD into courses and programs at the University. The investigation showed that it was about 25 percent of the courses that discussed the SD in some way; about 5 percent discussed the SD in details. The University form of competition for ideas of how to integrate the SD subject into courses (Kjeang, 2010).

Uni. D did not have any investigation about the SD integrated into courses in the beginning of their EMS.

5 Analysis and discussion

This chapter presents a discussion of the Environmental Review. Using prioritization matrix and a performance excellence model the results of the comparison have been analyzed and discussed. The chapter also discusses some other factors worth considering in the implementation process. With a focus on University of Borås, a gap analysis has been performed and the result discussed establishing the current situation in relation to the success factors. The chapter ends with recommendations for the implementation of the EMS and continuous improvement work for the future.

5.1 Environmental Review

In this environmental review it has been established that the University of Borås needs to update some of the current routines as well as develop new routines in some areas for environmental management. It is also important to strengthen the employees' awareness of environmental and sustainable development issues.

The University's aim is to certify their future EMS according to SS-EN ISO 14 001. The initially building of the EMS incorporates update and development of new routines. It is important to keep it simple. This will make the implementation process in 2010 easier and the EMS a natural part of the daily operation in the University.

As an academic institution the integration of SD into courses and programs at a University should be seen as paramount since it positively affects society in the long term. After the evaluation of the aspects is done, the University should try as much as possible to reduce the impact of the significant aspect.

5.2 Prioritization of Critical Success Factors

Having considered the various factors for the planning and implementation of EMS from the different universities, the authors have prioritized these factors using a matrix. The results are shown below in Table 5-1.

Table 5-1*: Success Factors Prioritization*

Success Factors	Management commitment	Training	Communication	Resources	Approach	competence for system management	Environmental Coordinators	Total
Management commitment		10	10	10	5	5	10	50 (40.85%)
Training	0.2		1	5	0.1	5	5	16.3 (13.32%)
Communication	0.1	1		5	0.2	5	5	16.3 (13.32%)
Resources	0.1	0.2	0.2		5	5	1	11.5 (9.40%)
Approach	0.2	5	5	0.2		5	5	20.4 (16.67%)
Competence for system management	0.2	0.2	0.2	0.2	0.2		5	6 (4.90%)
Environmental Coordinators	0.1	0.2	0.2	1	0.2	0.2		1.9 (1.55%)

1 Equally Important
5 Significantly More Important
10 Exceedingly More Important
1/5 Significantly Less Important
1/10 Exceedingly Less Important

5.2.1 Analysis of Results

From the prioritization matrix, it was observed that the most important success factor for environmental work in the Universities is Management commitment (with priority rating of 40.85 percent) and the Environmental coordinators as the least important with 1.55 percent priority rating. The relative importance of critical success factors is reflected in the percentile weight ratings. The order of importance is as follows: Management Commitment (40.85 percent), Approach (16.67 percent), Training (13.32 percent), Communication (13.32 percent), Competence (4.90 percent) and Environmental coordinators (1.55 percent).

5.3 Performance Excellence for EMS

A performance excellence diagram has also been drawn to illustrate different levels of commitment to each success factors (refer to figure 5-1). The results of both the matrix and the performance have been discussed below:

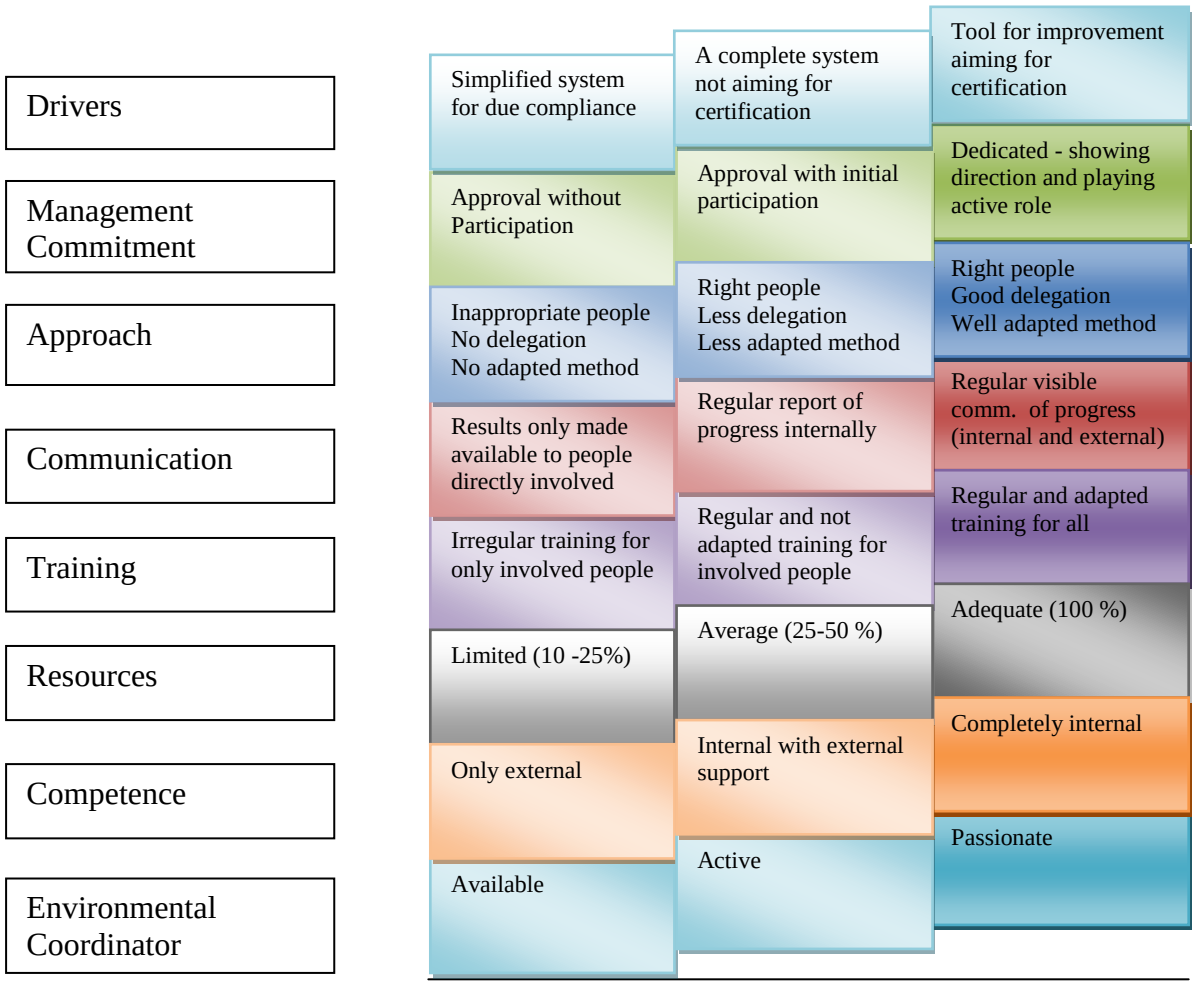

Figure 5-1*: Performance Excellence for EMS in Universities*

5.3.1 Discussion of results

From the above results, it is evident that the EMS is centred on the management's ability to demonstrate their commitment throughout the planning and implementation process. This implies the success of the system is largely dependent of the management. This is in support of the emphasis ISO 1400l places on management. This commitment varies from choosing the right drivers to start the work, through the setting of the right environmental policies with corresponding objectives and targets. Due to the enumerated barriers address in the previous chapters, it is important that management are seen as the forerunners of the system. Considering the performance of excellence it is just not enough for management to give approval and watch coordinators struggle to implement the system. Instead, they should communicate the universities decision to embark on the process to all and sundry within the university community. Since EMS is aimed at continuous improvement, management should keep abreast with regular progress leading to a review of the system. This will help put all hands on deck and sustain the interest of all parties with the environmental work.

The next important factor is Approach to the implementation of the system. It is possible to have a committed management adopting the wrong approach to the building of the system. Due to lack of mutual platform for faculty members and administrators, coupled with the lack of interest in academia when dealing with issues outside area of competence, it is necessary to adopt and in house approach suitable for the university to make the implementation process easy and flexible. In order to involve most people, the work should be delegated with a clear definition of responsibilities and support from management. Focus should not be on staff kicking against because the in doing so, even those interested are also lost. In the comparison among the different universities, both Uni A and B had developed their own way to methods to make this work for them – space ship and dot list respectively. The general distinguished difference among the three Universities approach were the different adaption level of method to suit the world of academia, focus of the EMS and the view of EMS. The focus for Uni. C was to work with SD integration of courses leaving less room in the approach for building a complete EMS. On the other side, Uni A, saw the EMS as a tool for improvement and was aiming for a certification as a proof for their effort and approach being successful.

Training and communication are seen as the twin pillar of the implementation process. Communication should run through the entire process along with a regular training for all. Situation where only directly involved people are trained have not yield the desired result. It is important that, the management communicate to the entire university community it intensions and how far they want to go from the time of the decision of EMS. As much as possible an interactive training which is best suited for academia should be encouraged. Since the system requires some changes within the organization it is important to clearly defined responsibilities and authority and communicate it well within the university community. Aspect such as emergency preparedness and reduction in resource usage requires proper training and communication. This will ensure that the entire university is prepared to prevent or protect any possible accident.

Considering the competence for maintenance the authors are of the view that if Uni C for example, had integrated the own people at the forefront with help of the consultants the system could have survived. It is therefore important to start the entire process with members of the university at forefront and supported by third parties (including consultants and students – who may leave after their contract or studies). In addition, the discussion revealed that some universities had started this work several times but almost always with new faces. For the maintenance and sustainability of the system it is incumbent on the management to ensure that as much as possible coordinators are kept and where it's necessary to change them, other people understudy them and properly handed over to.

The low percentage for the environmental coordinators in the prioritization matrix is not surprising. This is because though, all the universities under review had passionate coordinators yet some have not been very successful. The obvious conclusion of this is that the absence of the other factors will not lead to a successful system irrespective of the passion of the coordinator. Nonetheless, the choice of coordinators must not be overlooked since just active and available person cannot push the system in the event of the least opposition.

Within the Swedish environment, government legislation is a common driver for EMS work, but that in itself is not strong enough to ensure a successful system. Part of the reason being that results of the annual EMS report are not communicated externally. For instance, if this result would be put in the public domain it would be a different scenario and those how have

performed poorly would sit up. Again, there are no sanctions for not reporting or poor performance hence the morale for EMS work is quite low. For a sustained interest for EMS maintenance other drivers such as a thought of sustainability and educational responsibility must be looked at. From the results of the drivers, cost savings, and due diligence and compliance have been seen as weak drivers.

5.4 Other Elements worth considering

In the course of this work, the authors have also identified some factors which may not appear as success factors; however, their neglect would hamper the overall success of the implementation process.

5.4.1 Duration

To some people how much time is spent on the development and implementation may not be relevant. However, in the course of this work the planned duration was seen to be important. It was evident that for the certified institutions, a minimum of thirty months (two and half years have been devoted to this work. The authors therefore think that there is the need to hurry slowly with EMS implementation. This is to ensure that key factors are not left out in an attempt to hurriedly obtain certification.

5.4.2 Timing

It is of importance to consider the timing of the success factors because a wrong timing may not yield the expected outcome. For instance if management decide to show commitment at the time when people are already fed up with the system or perhaps faculty/staff members are asked to fill in questionnaires or give information when the decision to formal establish the system has not been communicated to them appropriately. Another example could be that a passionate coordinator will have no progress without the support from management. Having considered all the factors for success, efforts should be made to get them in at the right time to ensure a complete and harmonised system.

5.4.3 Keep it simple

In the pursuit to harmonise the operations of the University by EMS, processes and procedure ends up in complications. It is therefore of great importance to keep the system simple as much as possible. This involves a clear and simplified routines, communications in a simplified language (preferably visualised communication), interactive training among others.

5.4.4 Replacement (Temporal or permanent)

The difficulty in finding people with the same level of energy as the initiators warrants an early search for a possible replacement. In Uni A, the absence of the key personnel working fully with the EMS who was on maternity leave for some months had brought the system to a standstill. Sometimes it might be seen as a not prudent, but when people have to start learning from their very first day at new offices, they often mess up before picking up. It is important to avoid this as much as possible to ensure a sustained interest.

5.5 The way forward for University of Borås

One aim of this work was to suggest a way forward for University of Borås and how environmental work can be improved. It is therefore important to establish the current situation in relation to the identified success factors and then make recommendations.

5.5.1 Gap Analysis

University of Borås has indeed work with the different success factors in quite similar manner as the universities described above. This Gap analysis can be useful in the early phases of building or implementing the EMS. It gives the University a view of where they are today and what they need to work on to be successful with their EMS.

The data for the analysis are based on observations made by the authors when being part of the initial stages of EMS implementation. The analysis is from the authors' point of view and hence the result can be seen as subjective. The authors' estimation of the levels according to the university's work with EMS is based on a comparison with the performance excellence diagram and requirements for a certified EMS.

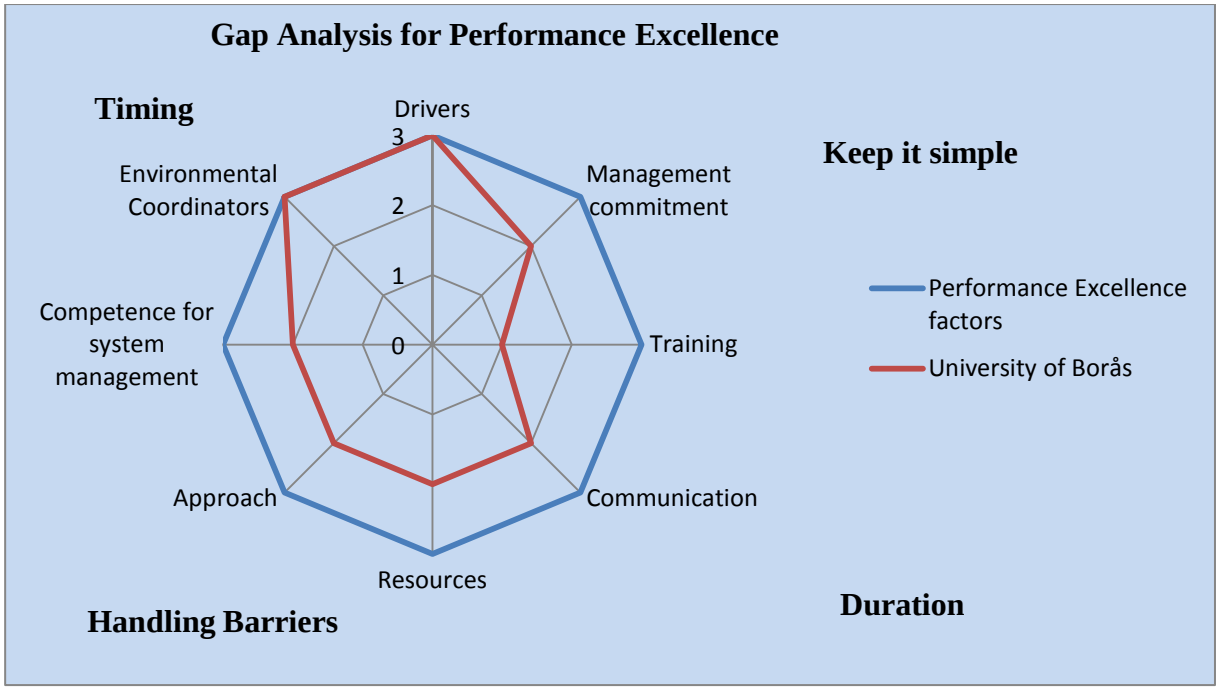

Figure 5-2: Gap Analysis for University of Borås

This gap analysis presents a picture of University of Borås as far as her commitment to the identified success factors is today. It shows the University had been good in choosing the right drivers and also a passionate coordinator for EMS. However, the authors are of the view that, since these factors are low on the priority scale if no timing is considered, there is the need for the University to work more with the training of staff members - to be successful with the rebuilding of their system. Most of the factors – management commitment, approach, resources, communication and competence for system management- are at level two and might not be awful on the scale, yet an enhanced consideration given to them would prove it worth since the system revolves around them. In doing this the four pillars at the corners of the chart must also be considered.

5.5.2 Recommendations for University of Borås

- The management (rector) needs to clearly communicate the university's intentions and preparedness to pursue EMS to the latter and how the University will reach this aim.

This will arouse interest and trigger discussions among faculty and staff members on the subject and how their department/institution can work to reach this goal.

- It is recommended when working with training to adopt an interactive training method which incorporate participant contribution and make them feel a part of the building process.

- Environmental responsibilities should be clearly defined to avoid confusion and to drive the EMS forward.

- As much as possible, the structure of the EMS system should be kept in a simple and easy to function.

- In setting up goals, the departments should be given the leverage to formulate their own goals in line with the overall university goals. However, the focus should be on the more achievable goals within a stipulated period and not necessarily the most important goals.

- The University of Borås should create an opportunity for reporting deviation in the system which should be communicated to the university community. This will help in the continuous improvement process. It must also be clear who is responsible to work with the follow up on deviations.

- The certification should be seen as proof of good work and a useful tool in the marketing of the University.

5.6 Discussion of methods

The use of in-depth interview was valuable for this work. It was optimal for collecting data on individual perspective and experience with EMS implementation. Nevertheless, the questions were modified for the different people.

The prioritization method was a useful tool in establishing the order of importance of the success factors and hence finding those that warranted the most attention. Inasmuch as it has proven to be a good tool, quantifying the importance was a difficult task. This is largely due to the lack of the incompleteness of data from some universities and also the subtle nature of the subject for less successful universities.

Gap-analysis has been used in this thesis to analyze how the University of Borås has worked with the success factors. The gap between the previous work and the future work help in finding necessary recommendation for the University of Borås.

6 Conclusions

In spite of the difficulty encountered, the project has been largely successful. The review conducted revealed the University's impact on the environment. Being an academic institution much attention should be on improving the indirect aspect – research and education, and cooperation with society. However, a conscious effort needs to be made to minimize the effects of the direct aspect - waste management, transportation, energy usage, paper usage, emissions among others.

Factors for a successful development and implementation of EMS have also been identified and ranked in order of importance – Management commitment, Approach, Training and communication, Resources, Competence, and Environmental Coordinators. Nonetheless, the timing of these factors, the simplicity of the system and the duration for the implementation should be taken into account while making efforts to handle the identified barriers pertaining to academia. To start with, while viewing the system as a tool with an aim, it is prudent to focus on a certified EMS, but a thought of sustainable society and a proper maintenance plan would ensure a sustained system even after certification. After implementation the certification should be seen as the starting signal for continuous improvement.

The university of Borås indeed has what it takes to be successful and should therefore take into account the given recommendation and forge ahead to be a leader in the this area.

6.1 Further work

It would be of interest to measure the benefits of EMS within the academic environment in an attempt to make the benefits more tangible. It is important to find out if working with EMS in this sense is worthwhile.

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ANNEX I

The Annexes, such as questionnaires, questionnaire results, law list and calculations is not included in this thesis report.

HÖGSKOLAN I BORÅS

INSTITUTIONEN INGENJÖRSHÖGSKOLAN

An Environmental Review

for

the University of Borås

- 2009 -

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1. Introduction

The national environmental objectives, which are reflected in the University of Borås' environmental policy, make it clear that the University play a major role when contributing to a sustainable development of society. Therefore, a school for the professions needs to make sustainable development part of the organizational culture. This is important because it creates awareness for students as they graduate to fulfil the needs of society. This can be achieved through the usage of tools, such as an Environmental Management System (EMS), which can positively affect the University's core competence - teaching and research - as well as reduce the negative impact on the environment.

The starting point for this work is to conduct this environmental review which will highlight environmental aspects of the University's activities, applicable legislation and current environmental routines. When the current situation is known, by incorporating the findings into policies and goals, a management system for continuous improvement can be planned and implemented. The overall purpose of the EMS will be to minimize any negative environmental impact caused by the University to the barest minimum and also increase the positive impact.

1.1 General information about the University of Borås

The University of Borås has about 15 000 students and in average 650 employees with campuses located in the city centre of Borås.

The University is governed by a board with the rector as the administrative head. It consists of six academic institutions supported by administrative support functions:

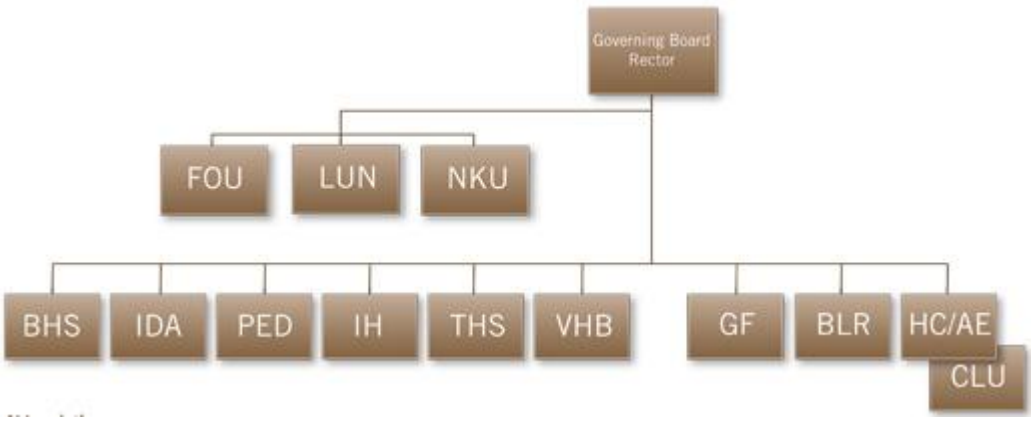

Figure 1-1: Organizational structure

BHS - The Swedish School of Library and Information Science
BLR - Library and Learning Resources
CLU - Centre for Learning and Teaching
FOU - The Research and Education Committee
GF - Central Administration
HC/AE -Shared Centres/Work Units
IDA - The School of Business and Informatics

IH - The School of Engineering
LUN - The Teacher Training Committee
NKU - The Committee for Artistic Development Work
PED - The School of Education and Behavioural Sciences
THS - The Swedish School of Textiles
VHB - The School of Health Care Science (Ahlgren, 2009)

1.2 Background

Since 1996 the University of Borås, in accordance to the governmental directives on EMS in public authorities, has been working with integration of environmental considerations in its organization. In 1999 the University was part of the governmental scheme; *"Miljöledare – 99",* with the aim of implementing an EMS in accordance to ISO 14 001 standard (Magnusson, 1999).

From the 1st of January 2010 the governmental directives has become stricter. The new ordinance requires that all public authorities shall have an implemented EMS that integrates environmental consideration into the organization (Miljödepartementet pressmeddelande, 2009). Based on the above the Rector of University of Borås has decided to implement an EMS with the aim of achieving an ISO 14 001 certification in June 2011.

According to the project plan for the planning, development and implementation of the new EMS an environmental review would be done during the spring of 2010. This environmental review follows the guidelines for a review, as stated in the ordinance and in ISO 14 001, and will after completion be the foundation for the EMS.

1.3 Method and work flow

The environmental review has been done during the spring of 2010 as part of a master thesis project. In 1999, Jessica Magnusson performed an environmental review which has been the foundation for this work, thus this is an update of the previous review. Changes which took place within the period 1999-2010, have been captured in this current review.

Birgitta Påhlsson, the coordinator for sustainable development at the University of Borås, has provided support in getting contacts with relevant people within the University to gather information for the review. The main part of the data has been provided by the environmental representatives at each institution/department, questionnaires and by external parties. The questionnaires are discussed in the next chapter.

Based on the limited time frame for this project, the amount of data regarding different aspects can differ for various institutions/department. Most of the data collected is from year 2009.

1.3.1 Distributed questionnaires

For the purpose of this review, two questionnaires have been distributed to the relevant personnel at the University of Borås.

Questionnaire 1 - Utvärdering av förankring av hållbar utveckling i grundutbildning(kurser) vid Högskolan i Borås.

This questionnaire was made and distributed by Birgitta Påhlsson, the environmental coordinator, with the aim of measuring how different courses and their contents are related to and deals with different perspectives of sustainable development. The questionnaire was in Swedish and sent to the Directors of Studies for distribution to personnel responsible for courses. The result was then later put together by the authors of the review. The outcome will be the starting point for continuous work with integration of sustainable development in education. A sample questionnaire is attached in ANNEX III.

Questionnaire 2 – Questionnaire for personnel at University of Borås

This questionnaire was made by the authors of the environmental review and included questions about personal and business travels as well as behaviour in regards to everyday energy and technology usage. The questionnaire was in English and distributed electronically in the internal "pingpong" system to all personnel at the University of Borås. The result was then later put together by the authors of the review. By establishing the present situation in regards to above matters it will provide a direction for the University in how to improve within these areas. A sample questionnaire is attached in ANNEX I.

1.4 Scope and limitations

The scope of the review covers all activities of the University of Borås, within her control, and facilities. Activities at Campus Varberg have been excluded. The aspects considered in the review are both direct and indirect, having an external environmental impact excluding issues concerning internal personnel working environment. Any environmental work performed by the student union and by students on their own are not included in the investigation. However, in the respect to the indirect aspect – integration of sustainable development in education and research – the students' impact on society and environment has been taken into consideration.

2. Current environmental management

Since previous work in line with EMS has been done at the University, some fundamental parts of the system are already in place. The University of Borås has an environmental policy which was updated in April 2009.

2.1 Current environmental management routines

The routines and guidelines that are currently in place and documented are listed below. Many of these routines/guidelines are in direct relation to the aspects of University of Borås' activities that were highlighted as significant in the environmental review made in 1999.

- General waste management routine for main campus
- Waste management routines for the Swedish School of Textiles
- Routine for fair-trade coffee and tea in coffee machines
- Guidelines for business travel
- Routine for purchase
- Instruction for archiving of protocols, papers and thesis

- Instruction for ordering copying at Higher Education Services (Högskoleservice)

- Routines for printing in student environment (default setting for double sided print outs) (Påhlsson, 2009).

Some of these routines have been detailed out in later chapters.

2.2 Structure for the University's current environmental management

At the University today, there is a coordinator for sustainable development who has been assigned to work with environmental issues and sustainable development. A committee for sustainable development, with both internal and external representatives, is supporting the coordinator in this area.

Alongside this review a structure for pursuing the EMS work on institutional/departmental level is being built up. At each institution /department an environmental representative has been appointed. These representatives have been part of the making of this review in the sense of providing much of its containing information and providing helpful advice concerning distributed questionnaires.

2.3 Comments

When the initial work with EMS started at the University of Borås in 1999, an extensive work was carried out in regards to preparing routines for implementation of an EMS. These routines and related documentation were prepared in accordance with the ISO 14 001 standard as recommended by governmental directives and can be of assistance when implementing and building the system today.

The results of this review together with the old documents available will be useful in the EMS rebuilding process. The initial phase of this process, in relation to the highlighted significant aspects, will include setting overall and detailed goals, as well as creating relevant routines for the achievement of these goals. This will help build a well structured system with clearly defined roles and responsibilities.

3. Facilities

The total area of University of Borås is 52 235 m² (Annual report, 2009). The university is running its operation in two places in the central parts of Borås. The main campus, located at Järnvägsgatan 10, and its five academic institutions and other departments, stretches over 40 961 m² of the buildings Balder and Sandgärdet. Its facilities are rented and the landlord is Akademiska Hus AB (Hallberg, 2010)

The Swedish School of Textiles, is located at Bryggaregatan 17, a rented apartment, and extends over in total 11 251 m². IBAB has ownership for 10 251 m² while the remaining 1000 m² is rented by Cellbes; Hultgren Vulcanus fastigheter (Annual report, 2009).

Skaraborgs Städ has been in charge of the sanitation at the University since January 2009 (Lövgren 2010).

3.1 Plans for new buildings and renovations

For renovations and new buildings, the main environmental impact is the amount of resources required and manufacturing of material. The environmental stress after completion is mainly due to the running of operations and maintenance of facilities. In the end when it is demolished, it is of importance to handle any waste products. The available infrastructure also needs to be considered when deciding locations for future buildings, to ease any environmental stress.

According to the renovation plan for 2010, University of Borås will renovate 3300 m² during 2010.

In regards to re buildings, it was decided in March 2010 that the future location of the Swedish School of Textile and a Science Park will be at the nearby industrial site - Simonsland. In cooperation with the City of Borås and other stakeholders the plan is to build an international intriguing research, innovation and culture scene, in favour of both the University of Borås' and the local region's development. In June this year, the board of the University will take the next step to establish the Swedish School of Textile at Simonsland provided requirements such as environmental demands, increased traffic safety, completion date at latest in the autumn of 2013 along with other requirements are met (Sundéen, 2010).

3.2 Comments

Any environmental demands and considerations during the planning process of renovations and new/re building shall be seen as an indirect environmental effect. Aspects of activities during actual running of the completed facilities, such as energy usage, shall be seen as direct environmental effect.

In the review from 1999 it was stated that roles and responsibilities of the landlord and the University can be made clearer. This is still a valid comment and of importance for the future.

4. Training

At the moment there is no general training given to staff members regarding the EMS or environmental and sustainable development issues. However, some sort of training is provided in relation to some direct environmental aspects such as transportation and paper usage. For instance, in the PowerPoint workshops and web conference/telephone-video education, reduction of paper consumption and reduction of business travel are mentioned respectively.

4.1 Comments

This may not reflect the true picture of the environmental and sustainable development training for personnel since not all the responsible people involved had the opportunity to respond within the project time frame.

The process of gaining management and organisational approval for the EMS implementation has started at the University. There have been activities to involve management and other staff members and to educate them about the EMS and sustainable development integration into courses before the end of the 2010 spring term. Examples of such efforts are different information meetings about EMS implementation and the certification process.

For future work with EMS implementation it is recommended to develop a structure for how to train staff members, appropriate training activities and routines for this.

5. Purchase

The University has a policy and a routine for purchase and these were updated in December 2009. The policy does state that the University shall contribute to an ecological sustainable society. The University is connected to VOS - Västsvensk Universitetssamverkan - which is a covenant for procurement made by the University of Gothenburg (Kristiansson, 2010).

Most of the purchases are done by the central administration; exceptions are made for chemicals, textiles and other material used by the Swedish School of Textiles as well as for some books and journals. The School of Textiles is also given material from local companies.

Currently there is no following up mechanism for purchased products.

Books and journal

The purchase of journals and books are mostly handled by the library. Information about purchased quantities of books and journals for 2009 is presented in the table below (Nordling, 2010).

Table 5-1: Purchase for Library (2009)

Type of book/journal	Quantity
Printed books	4 186
Printed journals	575
Electronic books	53 093
Electronic journals	24 406

Office material and paper

The suppliers of office material are Staples and AGE.

Furniture and textiles

The different suppliers of furniture and textiles are many. Kinnarps, Gärsnäs, Horreds, Håg, Lammhult, Materia, Offect, RH form, Swedese, Almedahls, Marks Pelle Vävare, Lundqvist Inredningar, Mitab, Karl Andersson & Söner, Alnäs and Fagerhult are some of the companies supplying the Universtity with furniture and textiles.

Office equipment

Most of the office equipment, such as computers and other technology, are made by the IT department.

Coffee

All the coffee purchased for the coffee machines in the University are either fair-trade or ecological coffee (Kristiansson, 2010).

5.1 Comments

Other purchased material such as *Disposables, Batteries, Lamps and florescent lights* are of interest to find more information about.

This section has not been completed due to the purchase department at the University being unable to provide information about purchased quantities for 2009 within the time frame of this project. This data is of importance to be able to properly assess the full impact of the aspect of University's purchase.

Even though the policy for purchase states that considerations in favour of ecological sustainability should be taken, it can be of interest to look into how well these considerations are communicated and lived by.

6. Emergency plans

In this chapter activities for emergency preparedness will be presented.

6.1 Main campus

Fire inspection in Balder and Sandgärdet are carried out twice a year, once by Akademiska Hus and once by Akademiska Hus in cooperation with the University. It is up to the University to coordinate fire drills and this has not been done in many years due to difficulties of coordinating such exercises. Proper routines in case of fire exist at all floors. The emergency showers are inspected by Akademiska Hus once every six months, but the staff in the laboratories do extra inspection for the emergency showers once every third month. The fume chambers are inspected once a year when Akademiska Hus is inspecting the buildings ventilation. The fume chambers also have a controlling system and in the event of ventilation system malfunctioning, an alarm is sounded. Both emergency showers and fume cupboards are inspected according to AFS 1997:10.

Akademiska Hus is also responsible for the electrical system checking and this is done once every 3rd year by a third party inspection (Hallgberg, 2010).

6.2 Swedish School of Textiles

In the School of Textiles there are routines for fire emergencies and fire drills. Procedures about fire drills have been improved and practiced frequently due to recent events. The last drill was made in 2010-05-05. IBAB and Brandservice both carry out fire inspection once a year, and the School of Textiles also checks the equipment when they make their safety walk through. The technicians in the laboratories are responsible for the controls of emergency showers. Both emergency showers and fume chamber are inspected according to AFS 1997:10.

IBAB is also responsible for the electrical system checking and this is done once every 3rd year by a third party inspection (Hedegård, 2010).

7. Chemical usage

Chemicals are mainly used by the School of Engineering and the Swedish School of Textiles. Smaller amounts are used by the School of Education & Behavioral Sciences, but this quantity is regarded as negligible.

7.1 The School of Engineering

Routines in the laboratories exist in practice and some general guidelines regarding chemical usage and disposal as well as safety routines are documented. All students and staff members using the laboratories must be aware of these routines. This is done by informing all new students, doctoral student and staff members about the laboratory regulations. These regulations must be agreed to and signed by all users of laboratories.

An electronic system called 'KemRisk' is used for purchase and inventory of chemicals. The inventory is done once a year (Hansson, 2010)

Table 7- 1: Quantities of chemical used by school of Engineering (2009)

Chemical type	Quantities of chemicals used
Heavy Metals – mostly Cu	4 kg
Metals: Zn, et al	0,25 kg
Organic Solvents: NMMO, acetone, methanol, ethanol, hydrocarbon, et al	355 kg
Halogenated Organic Solvents: chloroform, et al	73 kg
Acids and Basics	45 kg
Other Organic Chemicals	35 kg
Other Non-organic Chemicals	47 kg

7.2 The Swedish School of Textiles

Most of the chemicals used by the School of Textiles are water based. The institution has no proper follow-up mechanism regarding consumption of chemicals. The quantity of chemicals used can therefore not be estimated. 'KemRisk' is available for use but is yet to be applied.

The technicians in laboratories have been educated in marking of chemicals (Hedegård, 2010).

7.3 Comments

Proper documentation of the existing routines in the laboratories does not exist. Only the laboratories safety and general laboratories regulations are documented. This is the case at both institutions.

In regards to follow-up procedures for the quantity of chemicals used, proper routines should be created. In the case of School of Textiles, the initial step would be to get acquainted with the available system.

8. Transports

The aspect of transports can be seen as consisting of personnel transports; how the staff members travel back and forth to work, business travel; all business trips made by the personnel at the University, internal transports; transportation between the different facilities and transports of goods to the University. Within the timeframe of this project it has not been possible to investigate emissions caused by transportation of goods.

8.1 Personnel transports

To determine the environmental impact of personnel transports a questionnaire (see ANNEX I) was distributed to 888 staff members at the University (all employee's). In total 396 people participated, which gives a response rate of 44 percent for the whole questionnaire. It was 385 staff members that gave complete answers to the questions in regards to personal transports, meaning that 2 percent of the participants did not respond to these questions at all.

It has been established that 44 percent of the University's employees travel 7 716 256 km per year coming back and forth to work; by car, bus and train. 36 percent of the employees travel to work by car. The average distance travelled by car per year is 2 109 840 km. 17 percent of the employees travel to work by bus and 7 percent by train. The average distance travelled by bus per year is 1 306 968 km and average distance travelled by train per year is 4 299 448 km.

To calculate the impact of the entire university, the results of the survey have been extrapolated to 100 percent, indicating, the employees travel a total of 15 147 951 km annually.

101 staff members co-travel (travel with others), to the University of Borås. Approximately 22 percent of the personnel travel with an environmental friendly car. Amongst the personnel 20 percent are travelling from Gothenburg. 58 percent of the personnel do not normally work from home and 34,9 percent works from home one to two days a week. In table 8-1 information about personnel transports are presented, both for 1999 and 2010.

Table 8-1: Distribution of all employees' means of transportation and total average distance travel per day

Information from 2010				Information from 1999[1]	
Means of transportation	**Number of people**	**Percentage of total**	**Average distance traveled per day, km**	**Average distance traveled per day**	**Number of people answering**
Walk/ cycle	144	22	1038	201 km	58
Car	241	36	15094	4634 km	83
Bus	113	17	9350	2037 km	38
Train	47	7	30758	2185 km	18
Other	12	2	1047	No data	No data
Combinations of above	93	14	6900	No data	No data
Total	650	98	64186	9057 km	197

8.1.1 Calculations and assumptions for personnel transports

When making the calculations of the total average distances it has been based on the average distance in each interval. A year is seen as having 236 working days; (365 days per year) – (104 weekend days) – (25 holiday days).

In some cases it was stated that not only one mean of transportation was used when travelling back and forth to work. This is reflected in the table as combinations of above. Some of the combinations occurring in the survey result were bus and train, car and bus and bus/train and walk/cycle.

8.1.2 Emissions caused by personnel transports

Emissions caused by employees travelling back and forth to work are shown in the table below. The emissions from train travelling are small and can be seen as negligible.

Table 8-2: Emission caused by all personnel transports, (2010)

Emission	Quantity from car per year (kilo)	Quantity from bus per year (kilo)	Quantity from train per year (kilo)	Quantity from combinations per year (kilo)
CO_2	680354,9	76787,7	11554,8	110288,6
NO_x	251,0	549,8	0,0	320,3
HC	820,8	31,9	0,3	100,8
Particles	14,3	94032,2	0,0	21,9

See below for total quantity of emission.

Table 8-3: Emission caused by personnel transports, (2010)

Emission	Total Quantity per year (kilo)
CO_2	867442,7
NO_x	1121,3
HC	868564,0
Particles	94068,5

For complete information about personnel transports see attached survey results (ANNEX II).

8.1.3 Calculations and assumptions for emissions caused by personnel transports

When calculating the emission for personal transports co-travelling have not been considered. The fact that 42 percent of the employee's works from home, one or more days a week is not reflected in the result. This means that the emission can be lower if this factor is considered. In cases where a combination of different transportation means was declared, the least environmental friendly mean of transportation has been calculated. This means that the quantity of emission presented in table 8-1-1 and 8-1-2 is showing the worst case scenario.

The calculations have been made in the SJ Environmental Calculation System. For result of these calculations see (Annex V). The environmental data in that program was latest updated in August 2008. Further assumptions made for the calculations are:

- All cars runs on petrol and are models of year 2000 to 2004
- All train travels are made by regional trains and the trains are only half full.
- All busses runs on diesel and the busses are only half full when running. This is a limitation of the SJ Environmental Calculation system. It is worth considering that many off the busses in service for Västtrafik runs on ethanol.

8.1.4 Comments

The results of the personal transports have been based on the 44 percent respondent rate. It is important for the future to extrapolate the result to cover the entire University community.

A consideration in regards to personnel transports is, if and how the University can influence the employees to have less impact on the environment. A suggestion could be to encourage employees to use public transportation instead of the car. 20 percent of the staff members travel from Gothenburg. Considering this the University could in cooperation with Västtrafik offer better and lower price communication between the cities.

For information about the reliability of the result can be read in the discussion.

8.2 Business travels

Guidelines for business travels exist. The guidelines/routine states that if the different travelling options available are more or less cost effectively equivalent, the means of transportation that has less negative environmental impact shall be chosen. It is recommended to travel by train within Sweden. The University has no collective coordination for booking of business travel and when booking tickets for a business trip the University's contracted travel agents shall be consulted; American Express Business Travel and VIA Travel. According to guidelines it is the person travelling and the Heads of department that shall make sure that the policy and guidelines are followed. More information about these guidelines can be found on the University's web page.

Swedish authorities have been requested to annually provide an environmental accounting report to the Ministry of Environment and the Swedish Environmental Protection Agency. The information available at the University of Borås and reported in the beginning of 2010 is shown in the table below.

Table 8-4: Quantity of emissions from the environmental accounting report (2009)

	Flights under 500 km	**Flights over 500 km**	**Car**	**Train**
Total amount of CO_2 emission	32 621 kg	287 445 kg	83 640 kg	2 kg
Per annual manpower	62 kg	542 kg	158 kg	0,004 kg

8.2.1 Survey results for business travels

The work concerning collection of data for the environmental accounting report in regards to business travels has been found to be difficult and rough estimations was made. Due to these difficulties questions about business travel and business travel routines was included in the questionnaire. The aim was to try to establish a more complete picture of the number of business trips during 2009 and also to provide a direction for the University in how to improve in this area.

See below for a short summary of survey result for business travels.

Table 8-5: Number of business travels made during 2009

Destination	Number of trips
Sweden	2578
Scandinavia (not Sweden)	206
Europe	341
North America	46
Central and South America	7
Africa	10
Asia	46
Australia	2
Total	3235

393 employees answered the question about the current guidelines/routine for business travel. 69 percent of these employees use the routine when booking a business trip and only 6 percent does not. About 25 percent is unaware of the routine. Out of the 132 people that given a reason to why they do not use the routine, 41 people (31 percent) states that the reason is that when booking yourself you get a more suitable arrangement for a better price. The majority of people have stated "other reasons" for not using the routine, and written individual comments. See the survey results (ANNEX II) and discussion of method for more information.

72 percent of the 278 people are aware of the technology for computer/telephone/video conference system that the school provides. Out of the 258 people declaring if the used this technology, 50 percent have used it one or more times during 2009.

8.2.2 Comments

The main reason for not calculating emissions for the survey result is due to the statistics for this section being less reliable. The objective for the questionnaire was not reached and so the

flaws of the present system could not be revealed. More information about this can be read in the discussion of method.

The guidelines/routine can be improved out of two different perspectives. One perspective is to improve the follow up mechanism, to make it easier to measure the impact of business travel in the future. The second perspective is to make the routine stricter in favour of the environment. The work in regards to updating the current routine for business travels has started.

8.3 Internal transports

No information about internal transports has been found within the timeframe of this project, but this aspect is likely to be of less significance.

9. Waste management

The University of Borås, having different facility owners, work with two separate waste management routines, one for main campus and the other for the Swedish School of Textiles.

Most of the collected waste at University of Borås (from all facilities) is picked up by Borås Energi och Miljö. The organic waste is decomposed at Sobacken in Borås and the burnable waste is burnt to contribute to district heating and cooling. Glass is recycled for new glass and scrap metal is transported to Gothenburg for recycling as much as feasible. The routine is silent about the disposal of non recyclable waste.

The other waste fractions are transported to different recipients and recycled as much as feasible. Metal packages and plastic packages are transported to FTI where it is recycled. The waste containing quicksilver is transported to SKAB where it is put into safe landfill.

Paper and cardboard is transported to local recipients for recycling and production of new packages and surface layer on plasterboards.

For halogenated distillation- and reaction residues, other solvents and solvent mixtures and laboratory chemicals that consist of/contains dangerous substances including mixtures of laboratory chemicals the receiver is SKAB. The waste is sent for high temperature combustion.

Other waste with particular requirement for disposal due to infection risk is transported to Renova for combustion.

Electronic waste and dangerous waste (fluorescent lamps, low energy bulbs) are dismantled by Elkretsen (Glans, 2010). The cost for disposal of electronic waste for 2009 was 3517 SEK.

Most of the office furniture is reused by employees. During 2009 the cost for disposal of furniture and a mixture of other unsorted waste fractions were 2024 SEK. The quantity was one container; 804 kg (Hallgren, 2010)

Toners are collected by the supplier of the copy machines and printers. There is no statistics available for the amount of used toners (Kristiansson, 2010)

9.1 Main Campus

The waste generated is sorted into 15 different fractions. For the facilities at the main campus the waste management is shared with Hotel Scandic Plaza. See in below sub-sections for the individual fractional routines and quantity of waste for 2009. It is also stated in the routines who is responsible for disposal and how each fraction is recycled.

9.1.1 General routines for waste management

The routine can be found at University's webpage.

Burnable waste (white bags)

Litter bins are placed in all offices, staff rooms, rest rooms, student pantries, and in lecture and computer rooms. It is the responsibility of the cleaning staff to empty these bins and take it to the waste storage in the basement of Balder.

Organic waste (black bags)

The litter bins for organic waste can be found in the staff rooms and in cafeterias, both in Balder and Sandgärdet, as well as in student pantries. It is the responsibility of the cleaning staff to empty these bins and take the content to the cooling room for waste storage in the basement of Balder.

Paper

Each office has a small container for paper waste. It is the responsibility of the employees, on regular basis to empty this container into a blue recycling bin. These bins can be found at different places in the University; in the library and at each institution/department as well as in lecture and computer rooms. The janitors are responsible for emptying the bins into the large container in the basement.

Cardboard

In copy rooms around the University there are trolleys placed for cardboard recycling. It is the janitor's responsibility to take the trolleys down to the waste storage in the basement.

Paper packing

All packages that contain more than fifty percent paper are recycled in special containers in environmental storage lockers. These storage lockers are available in staff and rest rooms, student pantries and in other common rooms. The janitors are responsible for emptying these lockers.

Glass

There are two separate sections in environmental storage lockers for recycling of glass - one for clear glass and one for coloured glass. These storage lockers are available in staff and rest rooms, student pantries, cafeteria and in common rooms. The janitors are responsible for emptying these lockers and taking the glass to the storage room in the basement.

Dangerous waste

Dangerous waste including fluorescent lamps, low energy bulbs and batteries are kept at the janitors' office. It is the responsibility of the Akademinska Hus/janitors to take them to the storage in the basement. The batteries are handed in at the janitors' office and it is their responsibility to dispose them.

Scrap metal

A container for scrap metal is available at the chemistry laboratory and it is the responsibility of the janitors to empty it.

Electronic waste

It is the responsibility of the IT department and the electronic laboratory to collect and take the electronic waste to trolleys in the basement.

Furniture

The janitors are responsible for taking furniture that is to be disposed to the basement. At first the furniture will be left at the loading bay for employees to take for private use. Later the remaining pieces of furniture will be moved to a final pickup point and are disposed.

Toner cartridges

The IT department is responsible for disposal of printer toners and the suppliers are responsible for the disposal of toners for copy machines.

Aluminium cans

There is a section in the environmental storage lockers available for recycling of aluminium cans. These storage lockers are found in student pantries. It is the responsibility of the cleaning personnel to empty the storage lockers and deposit the cans which are later recycled.

Metal packages

There is also a section in the environmental storage lockers available for recycling of metal packages. These storage lockers are found in staff rooms, rest rooms, student pantries and in common rooms for students, in corridors and close to the cafeterias. It is the responsibility of the cleaning personnel to empty the storage lockers and transport the metal packages to a container in the basement.

Non recyclable waste

Non recyclable waste such as porcelain are recycled in a separate section in the environmental storage lockers available in staff rooms, rest rooms, student pantries, in common rooms for students in corridors and close to the cafeterias. A separate container for this waste is also available at the chemistry laboratory (Lövgren, 2009).

9.1.2 Quantity of waste for Main Campus

The waste from main campus and Hotel Scandic Plaza is stored in the basement of Balder. Waste from Hotel Scandic Plazas is estimated to be about 30 percent of the total quantity. As a result of the University not being able to measure her own generated waste, the quantity reported in this review is the data given by waste handling companies. However data for quantities of glass, scrap metal and toners was not available within the review period (Hallberg, 2010).

Table 9-1: Quantity of waste for main campus under HB jurisdiction

Waste type	Quantity	Cost
Burnable waste	46 600 kilo	52 408,11 SEK
Organic waste	56 160 kilo	36 716,09 SEK
Paper	40 320 kilo	15 632,50 SEK
Cardboard	23 400 kilo	27 367,85 SEK
Metal packages	2 496 kilo	5 395,00 SEK
Plastic packages (no routine at HB for this)	874 kilo	5 395,00 SEK

Source: Miljörapport 2009 för Järnvägsgatan 1, Borås Energi och Miljö

The cost for these fractions is part of the rent that the University of Borås pays to Akademiska Hus. The total annual cost for Akademiska Hus as a result of waste handling and disposal during 2009 was 216 624,96 SEK (Faktura per taxa, 2010).

The University is responsible for disposal of electronic waste, dangerous waste and chemicals. The charge for this is paid separately and no information about these costs has been available. The battery container has not been empted during 2009 hence no statistics of quantities is presented. Quantity of electronic waste is large for 2009 due to many renovation works (Hallberg, 2010).

Table 9-2: Quantity of waste for main campus under HB jurisdiction (2009)

Waste type	Quantity
Electronic waste	6 639 kilo
Dangerous waste (fluorescent lamps, low energy bulbs)	650 items

Source: Statistik per hämtställe 2009, för Högskolan i Borås, Borås Energi och Miljö

9.1.3 Quantities of waste for the School of Engineering at main campus

From the laboratories at the school of engineering, there is some special waste that is not mentioned in the general routine for the main campus. The quantities of waste can be seen in the table 9-1-3.

Table 9-1- 3 Quantity of chemical waste for School of Engineering (2009)

Waste type	Quantity
Waste containing quicksilver	6 kg
Halogenated distillation- and reaction residues	17 kg
Other solvents and solvent mixtures	18 kg
Laboratory chemicals that consist of or contains dangerous substances, including mixtures of Laboratory chemicals	18 kg
Other waste with particular requirement for disposal due to infection risk	112 kg

Source: Statistik per hämtställe 2009, för Högskolan i Borås-Kemilaboratoriet, Borås Energi och Miljö

The institution also have very small quantities of waste oil, therefore it can be seen as negligible.

9.2 Swedish School of Textiles

The waste generated is sorted into 12 different fractions. For the facilities at the School of Textiles the waste management is shared with Komvux and Proteco. See in sections below for the individual fractional routines for 2009. It is also stated in the routines who is responsible for disposal and how the waste is recycled.

9.2.1 General routines for waste management

Burnable waste (white bags)

Burnable waste such as paper, wood and other non- recyclable waste are collected from litter bins that are placed in all offices, staff rooms, rest rooms, student pantries, and lecture- and computer rooms. The cleaning personnel have the responsibility to collect and transport the waste to the basement.

Organic waste (black bags)

It is the responsibility of the cleaning personnel to empty the litter bins for organic waste which is taken to the waste room at the basement. These bins can be found in the staff rooms and in the cafeterias.

Paper

Waste such as copying paper, old newspapers and catalogues have small collective containers at all offices, these containers are emptied in a bigger green container by the personnel at the School of Textiles. There are also green containers in printing rooms and on fourth floor to collect the student's paper. It is the responsibility of the janitors to empty the green containers and transport it to the waste room at the basement.

Cardboard

There are divided containers in the copying room for collection of this waste. It is the responsibility of the janitor to collect and transport the waste to the basement.

Paper packing

This regards packages which contains at least 50 percent paper. This waste is collected in the environmental storage locker in the personnel room and at student pantry. It is the responsibility of the cleaning personnel to collect this waste.

Glass

The students and staff put their old glass bottles in the environmental storage lockers in the personnel room and in the student pantry. It is sorted in clear and coloured fractions. The cleaning personnel are responsible for emptying the environmental storage lockers and taking the glass to the basement.

Toner cartridges

It is the responsibility of the IT department to collect the toners from the printers. The supplier of copying machines is responsible for the copying toners according to the contract. Toner cartridges are one part of the producer responsibility for electronic- and electrical products.

Aluminium cans

Students and personnel puts their used aluminium cans in the environmental storage lockers located in the staff room and in the student pantry.

Metal packages

Metal packages are collected in the environmental storage lockers and it is the responsibility of the cleaning personnel to bring them to the container in the basement.

Dangerous waste

Dangerous waste such as fluorescent lamps, low energy bulbs and batteries are collected by the janitors and put in the basement.

Electronic waste

It is the duty of the janitors and the IT department to collect old computers, copying machines and other used technology products.

Furniture

This waste is collected by the genitors and but in the basement. It is allowed for students and staff members to reuse old furniture (Avfallsrutin Textilhögskolan, 2010).

9.2.2 Quantity of waste for Swedish School of Textiles

Chemical waste and other fractions of dangerous waste are collected and transported to local recycling centre since the quantities are very small. Most of the chemicals used are water based. The institution also have very small quantities of waste oil, therefore it can be seen as negligible.

This section has not been completed due to the IBAB being unable to provide information about quantities of waste for 2009 within the time frame of this project. This data is of importance to be able to properly assess the full impact of the aspect of University's waste.

9.3 Comments

The general routines for both main campus and School of Textiles work in practice and are documented. However, some routines in regards to certain fractions need to be updated and reflect reality in a better way. One example of this is the 16 environmental storage lockers. According to the routine the environmental storage lockers are located at different places in the University, but responsible people are not sure about their actual location. In the cases where there is a routine placed beside the lockers it is recommended to update the routine. For the future it would be of interest to look into whether or not the lockers fill their function.

For the environmental storage lockers the responsibilities stated in the routines can be made clearer.

The second example is plastic packages, which can be recycled in the environmental storage lockers and are later picked up by Borås Energi och Miljö. This is not reflected in the general routine at all.

No proper data about an existing routine in regards to sharp materials with special requirements for disposal due to infection risk, used by the School of Health Care Science, has been provided within the timeframe of this review.

9.3.1 Comments about chemical waste management

Many of the chemical waste routines work in practice, but are not properly documented. The quantities of chemical waste are not being measured by the University herself. The information about quantities of waste provided for this report is provided by the company picking up the waste, Borås Energi och Miljö. The lack of routines and follow up of quantities of chemical waste needs to be investigated further to make sure that the University is complying with relevant laws, e.g. 'Avfallsförordningen'.

10. Usage of raw material and natural resources

The usage of raw material and natural resources are affected by the University´s operations, especially energy usage, water consumption and material usage. In this review electricity usage, heating and cooling of buildings, water and paper usage have been evaluated.

Electricity usage

The supplier for electricity is Borås Energi. The annual amount of electricity usage at University of Borås (2009) is 4 585 970 kWh: 82 kWh per m². The renewable source of electricity is 90 percent.

Other energy usage

Borås Energi is also the supplier for heating and cooling for the University. The total amount of energy for the heating and cooling system is 4 286 620 kWh: 82 kWh per m². This amount of energy is completely renewable produced by burning waste and fuel chips. And the cooling

is produced by heating pumps. The electric power that runs these heating pumps is produced by combustion of waste.

The University´s total amount of energy is 95 percent renewable (Påhlsson, 2010).

Water usage

For the main campus, 13619 m³ amount of water was used during 2009 with Borås Elnät as the supplier. The waste water is connected to the city of Borås sewage system and it is refined at Gässlösa (Hallberg, 2010A).

Data about water usage at the Swedish School of Textiles was not available at the time of this report. However, it was established that the waste water is also connected to the city of Borås sewage system where it is refined at Gässlösa.

Usage of paper

The total amount of used paper in 2009 was 6 116 500 (in pages) for the whole University (Hallgren, 2010B). Though there are routines to make double sided printing a default option for students, most of the available printers can only print on a single side. This could be as a result of lack of printers with such technology. In comparison to 1999, the paper consumption has been reduced by 50 percent

10.1 Comments

In this review no calculation regarding the transports of incoming goods has been performed, due to time limitation.

If the 29 percent of people which does not turn off their computers when leaving for the night would, the electricity usage could be reduced (Survey results, ANNEX II). It has come to light that there is a possibility that the IT department has advised people to not turn off the computer, so updates can be done over night. It can be of interests to investigate this further to make sure that in the cases when no overnight updates are necessary computers are turned off.

It is also worth mentioning that 82 percentages of the employees does not turn off their computers when leaving the office for meetings or lectures.

11. Emission to air

In this chapter the emission caused by the University of Borås at Borås Energi´s district heating and cooling plant in Borås has been calculated.

Table 11-1: Emissions caused by production of district heating and cooling at Borås Energi

Emission	Quantity (ton)
CO_2	1839,73
CO_2 (from fossil fuel)	366,31
NO_x	1,44
S	0,075
Particles	0,0377

When calculating these emissions, the figures are taken from Borås Energi och Miljö annual report. The calculations are: (Total amount of emissions / Total energy production) x (University of Borås district heating and cooling usage).

Emissions from the fume chambers and colour mixing (for textiles) to the air are small and can be seen as negligible.

12. Emission to ground- soil and water

Today there are no emissions to soil- and groundwater. The University is connected to the local sewer system. However, if no proper routines for handling chemicals and disposal of chemicals are in place and documented a mistake can easily be made, e.g. dispose of chemicals in the sink. This will then cause emission to water and ground. See section 9.3.1 for more information about routines at laboratories.

13. Other local aspects

The transportation of personnel, office equipment and other products that are linked to the daily operation of the University produces noise. The situation with the traffic is worth considering in the planning of the relocation of THS. Other than the noise there is no local aspects linked to the University.

Usual constructional noise is expected during the construction of the new complex for Swedish School of Textiles at Simonsland. However, this could be seen as an aspect under irregular situation for HB

14. Indirect aspects

In academia the indirect aspects of the environmental knowledge, being the ecological part of sustainable development is a great part of the work for a more sustainable world. Another part of this is the importance of having sustainable demands, including environmental demands, when cooperating with external parties. It is in relation to these indirect aspects the University has a great opportunity to increase any positive impact in favour of a more sustainable society.

14.1 Education and Research

The major indirect impact that the University has on the environment is to provide the students with the knowledge and understanding of Sustainable Development (SD). To achieve this it is important to integrate SD in to education and research at the University.

To investigate how far the University has come with the SD integration work, a questionnaire was sent out to the teachers at the University (See Annex III). Of the Universities total amount of courses 29 percentage answered the questionnaire.

The foundation for this estimation is based on the total amount of current courses that each institution offers during 2010. Courses with the same name and content that are included in different programs have only been counted once. The part of the survey result that will be presented in this review is the result of question one.

See below for total number of courses that handle SD:

Table 14-1: Total number of courses with SD integration

Part of the courses that handle SD in total			
0%	**<50%**	**>50%**	**100%**
85 courses (10 %)	116 courses (4%)	38 courses (5%)	5 courses (0, 01%)

The result is separated into the different academic institutions and can be seen below:

The School of Education and Behavioural Sciences (PED)

29 courses were evaluated in this survey; meaning that 19 percent of the intuitions' total 153 courses has been evaluated.

Table 14-2: Number of courses with SD integration in PED

Part of the courses that handle SD			
0%	**<50%**	**>50%**	**100%**
4 courses	23 courses	1 course	1 course

The Swedish School of Textiles (THS)

62 courses were evaluated in this survey; meaning that 44 percent of the intuitions' total 141 courses has been evaluated.

Table 14-3: Number of courses with SD integration in THS

Part of the courses that handle SD			
0%	**<50%**	**>50%**	**100%**
22 courses	27 courses	3 course	1 course

The School of Health Care Science (VHB)

23 courses were evaluated in this survey; meaning that 22 percent of the intuitions' total 99 courses has been evaluated.

Table 14-4: Number of courses with SD integration in VHB

Part of the courses that handle SD			
0%	**<50%**	**>50%**	**100%**
2 courses	10 courses	11 course	0 course

The Swedish School of Library and Information Science (BHS)

21 courses were evaluated in this survey; meaning that 21 percent of the intuitions' total 101 courses has been evaluated.

Table 14-5: Number of courses with SD integration in BHS

Part of the courses that handle SD			
0%	**<50%**	**>50%**	**100%**
13 courses	4 courses	4 course	0 course

The School of Engineering (IH)

63 courses were evaluated in this survey; meaning that 36 percent of the intuitions' total 175 courses has been evaluated.

Table 14-6: Number of courses with SD integration in IH

Part of the courses that handle SD			
0%	**<50%**	**>50%**	**100%**
26 courses	24 courses	12 course	2 course

The School of Business and Informatics (IDA)

50 courses were evaluated in this survey; meaning that 31 percent of the intuitions' total 162 courses has been evaluated.

Table 14-7: Number of courses with SD integration in IDA

Part of the courses that handle SD			
0%	**<50%**	**>50%**	**100%**
18 courses	28 courses	7 course	1 course

For complete information about from survey see attached statistics (ANNEX IV).

14.1.1 Comments

Other relation than presented above can be of interest for establishing proper measures in regards to what needs to be done when improving in this area. One scenario that can be investigated further is when SD is part of the course, but it is not seen as relevant to be examined.

Presently, no workshops or education for integration of SD into courses is given to the teachers. It is of importance for further work with integration of SD into courses to start a discussion about how to relate SD to different subject fields.

For future work with measuring integration of SD in courses it will be of use to have a good structure for how to collect the data and a good general method for how to estimate the total number of courses/programs at each institution. The total number of courses used in this survey result has either been calculated by the institution environmental representatives or by the authors of this review. In both cases this has been done according to the same guidelines in regards to what courses to include and to exclude.

14.2 Cooperation with society

The University´s actions when being part of external projects will have a long term impact on SD in society. By considering sustainable development, including environmental issues, and having demands when cooperating with others this can be achieved.

The University of Borås is in cooperation with many external organizations, local and regional as well as national and international organizations. At the local level the University cooperates with the City of Borås. The University takes active part in external projects and one of the reasons for this, is to create integration between the students and the industry. Projects with external organizations like Drivhuset and ESPIRA work for the innovation of business development which will lead to a more sustainable economical development in the region.

The University also takes an active part in projects for a better social welfare for old people, disabled persons and children.

To sustain the environmental part of the Sustainable Development, the University works with Waste Refinery, a Swedish Excellence Centre coordinated by SP Technical Research Institute of Sweden to provide the community with renewable energy, environmental friendly and safe waste management procedure (Rimbäck, 2009).

The University also cooperates with and are members of international organisations such as European University Association (EUA) and Bolognaprocessen. These organisations work with issues such as represent and support organisations for higher education as well as making it easier for students to study and work abroad. The University also takes part in waste management projects in Asia.

15. Evaluation of environmental aspects

By evaluating the identified aspects the ones of most significance are determined. When the current situation is known, then by incorporating the findings into policies and goals, a management system for continuous improvement can be planned and implemented. The environmental direct aspects have been rated according to:

1 = Small
2 = Medium
3 = Major

The evaluation of aspects shall be done according to valuation- and prioritization model. The factors considered during the evaluation are:

1. The extent of the environmental impact
2. The severity of the environmental impact or magnitude of positive impact in regards to the indirect aspects
3. The duration of environmental impact
4. The likelihood of the impact to happen
5. The University possibility to control and potential to make changes
6. Legislative demands, market- and other demands
7. The society's environmental outlook

The environmental aspects are also connected to the Swedish environmental objectives (listed below)

1. Reduced Climate Impact
2. Clean Air
3. Natural Acidification Only
4. A Non-Toxic Environment
5. A Protective Ozone Layer
6. A Safe Radiation Environment
7. Zero Eutrophication
8. Flourishing Lakes and Streams
9. Good-Quality Groundwater
10. A Balanced Marine Environment, Flourishing Coastal Areas and Archipelagos
11. Thriving Wetlands
12. Sustainable Forests
13. A Varied Agricultural Landscape
14. A Magnificent Mountain Landscape
15. A Good Built Environment
16. A Rich Diversity of Plant and Animal Life (Naturvårdsverket, 2009).

15.1 Evaluation of direct aspects

Table 15- 1 Evaluation of environmental direct aspects

Activity that is the source to the environmental aspect	Direct environmental aspect	Environmental impact	Connected to Swedish environmental objectives	Rating
Transportation • Personnel transportation	NO_X, CH, SO_2, O_3, Particles, CO_2, Noise	Acidification, Eutrophication, Health outcomes, Biological diversity, Plant harm, Ozone attrition, Greenhouse effect	1,2,3,5,7, 9,11,12, 13,15,16	
• Business travel	NO_X, CH, SO_2, O_3, Particles, CO_2, Noise	Acidification, Eutrophication, Health outcomes, Biological diversity, Plant harm, Ozone attrition, Greenhouse effect	1,2,3,5,7,9, 10,11,12, 13,15,16	
• Product- and service transportation	NO_X, CH, SO_2, O_3, Particles, CO_2, Noise	Acidification, Eutrophication, Health outcomes, Biological diversity, Plant harm, Ozone attrition, Greenhouse effect	1,2,3,5,7, 9,10,11, 12,13,15,16	
Energy usage • District heating/ cooling	NO_X, CH, SO_2, O_3, Particles and heavy metal	Acidification, Eutrophication, Health outcomes, Biological diversity, Plant harm, Ozone attrition	1,2,3,5, 7,9,11,12, 13,15,16	
• Electricity usage	NO_X, CH, SO_2, Particles and heavy metal		1,2,6,7,9,11, 12,13, 14,15,16	

Water consumption		Resource economy	8,16	
Waste	Land fill, methane gas, N, P	Disrupted cycle, Greenhouse effect, Health outcomes, Eutrophication	1,4,7,8, 9,11,13,16	
Hot/ cool-air system	HCFC (R22, R404A)	Ozone attrition,	4,5,14,16	
Procurements • Chemicals	Chemical emission	Health outcomes, Biological diversity	4,6,9,10,11,16	
Computers	flame retardants and heavy metals	Health outcomes, Biological diversity	4,9,10,16	
Paper	SO_2, NO_X, BOD, N, P, Chemicals from the bleaching process	Acidification, Eutrophication, Health outcomes, Biological diversity	1,2,3,4,6, 7,9,11,12,13,16	
Furniture	CH, forest enterprise	Health outcomes, Biological diversity, Plant harm	1,4,12,13,16	
Other procurements				

Comments

This rating will be done in June 2010 outside the time frame for this project. It will be performed by personnel at the University that later will be part of building and maintaining the EMS to encourage involvement and awareness of the findings in the review.

15.2 Evaluation of indirect aspects

Table 15- 2 Table 15.1 Evaluation of environmental indirect aspects

Activity that is the source to the environmental aspect	Indirect environmental aspect	Environmental impact	Connected to Swedish environmental objectives	Rating
Sustainable Development integrated into under graduate education	Graduated students have knowledge and skill to apply in their professional life	Sustainable Development	1-16	
Sustainable Development integrated into research and education	Contribution to the development within the environmental field	Sustainable Development	1-16	
Sustainable Development integrated into research	Advanced knowledge within the environmental field. Integration of Sustainable development within relevant research fields.	Sustainable Development	1-16	
Information activity	Observe environmental aspects in information activity	Increased awareness regarding the environmental aspects	1-16	
External projects	Integration of environmental aspects	Increased awareness regarding the environmental aspects	1-16	
International cooperation and projects	Contribution to the development society, capacity building	Sustainable Development	1-16	
New- and rebuilding	Elaborate environmental program	Increased awareness regarding the environmental	1,4,12,13,15,16	

		aspects		

Comments

This rating will be done in June 2010 outside the time frame for this project. It will be performed by personnel at the University that later will be part of building and maintaining the EMS to encourage involvement and awareness of the findings in the review.

16. Compliance to laws

To get an ISO 14001 certification a list of laws to cover the organizations environmental impact of their operations must be mapped. A list of laws has been preformed (See separate document).

16.1 Comments

The environmental legislation shall set the minimum standard for an organizations environmental work. As recommendation from ISO 14 001 determining how legal requirements apply to an organization significant aspects can be established during the requirement identification process. For the purpose of the future running of an EMS it is beneficial that knowledge of relevant regulations and how these regulations apply to the University of Borås' different activities is gained and kept in house by involved key personal.

Based on above the list of laws attached in this environmental review is not completed, it is only a foundation for the University to build on to and keep updated. The structure and components of the list is built up according to recommendations from a third party certification body, SP, and is based on a previous list from 2001. In the process of updating the list it has been of great help to look at how other Universities, in particular University of Gävle, has been working in the area of compliance to laws.

The list of laws that has been put together has to be improved in certain areas. It needs to be updated. It is also very importance to relate the laws to the everyday activities of the University and considerations have to be made in regards to how to secure compliance to relevant laws.

For future work in regards to keeping up to date with new and amended regulations, cooperation with a jurisprudent party would be beneficial. There are many different companies that offer this kind of services, such as Notisum och Rättsnätet samt Rang- Sells Miljökonsult AB.

As part of the University's previous work in this area, a routine for compliance to regulation was written, and this routine can be of assistance when building up a new system.

The University will start updating the list in June 2010.

17. Discussion

In this part of the review the authors will discuss around the result of the review and the methods that have been used.

17.1 Discussion of results

In this environmental review it has been established that the University of Borås needs to update some of the current routines as well as develop new routines in some areas for environmental management. It is also important to strengthen the employees' awareness of environmental and sustainable development issues.

The University's aim is to certify their future EMS according to SS-EN ISO 14 001. Initially when building the EMS it incorporates update and development of new routines. It is important to keep it simple. This will make the implementation process in 2010 easier and the EMS a natural part of the daily operation in the University.

17.2 Discussion of method

The involvement of external party such as students in the performance of an environmental review has in some cases been seen as less gainful to Universities. Partly, the reason for this is that they have less knowledge about the organization and its structure, and therefore spend much time to get to know the organisation, even though they are assisted by personnel of the organisation. Again all the experience gained in the process will be lost when these external parties leave. To make the University's work easier in the future when updating the environmental aspects it is important to have a routine for how this should be performed.

The survey about personnel transports had a response rate of only 44 percent considering the fact that the questionnaire was sent to 888 employees. However, in reference to the Annual report for the University of Borås the average number of employees is 650 which implied a response of 650 would have represented the entire staff, hence the actual response rate recorded as 60.9 percent.

When analyzing the survey result it has become evident that there are problems concerning the statistics given by the "ping pong" system. The main reasons for this are restrictions of the system in combination with limited knowledge of the system. These factors have contributed to a poor restructuring of the questionnaire. Therefore the statistics for business travel can be seen as less reliable and no calculations have been made other than the number of business trips. For the future it is recommended to use some other medium to distribute a questionnaire of this kind.

In general it takes three months to perform an environmental review, due to different reasons this review has been performed in half the time. This has affected the amount of information presented, and it is worth considering for future updates.

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