

Twelve years of environmental work in the Swedish construction industry



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Summary

Results from three questionnaire surveys, carried out in 2002, 2006 and 2010, that investigate environmental attitudes, management and performance in the Swedish construction industry are compared with the aim to explore the development of environmental practice over time. Three trends are identified: 1) focus on environmental management activities related to an EMS, 2) growing stakeholder pressure, and 3) increasing environmental activities of a technical nature. The sector perceives environmental work as self-regulating rather than as green business opportunity.

Keywords: questionnaire survey, construction industry, environmental attitude, environmental management

1. Introduction

Over the last decades the Swedish construction sector has made much effort to develop green building practices. Researchers within the field have provided theoretical knowledge on how to design green buildings and analytical environmental management tools have been developed to guide the practitioners. This study is based on results from three structured questionnaire surveys, carried out 2002, 2006 and 2010, that investigate environmental attitudes, management and performance in the Swedish construction industry. The aim is to empirically explore the development of environmental practice over time. The questionnaires are directed to environmental managers or alike at companies within construction, real estate, consulting engineering and architecture with at least 50 employees (20 for architects). The total number of companies included in the survey is 534 in 2002, 542 in 2006 and 458 in 2010. The response rate varies from 41% to 45%. The data has been analysed by using the statistical software SPSS®.

Results of the 2002 survey showed that many companies actively worked with environmental issues, many companies educated their personnel, implemented environmental management systems (EMS) and established environmental policies. In 2002 the sector focused on a few aspects like handling of environmental hazardous substances and waste. Companies preferred management measures on an organizational level whilst it was more difficult to achieve acceptance of measures of technical nature within the companies. Another result from 2002 indicated a lack of driving forces such as a green market and that companies were better in planning than following up of their environmental work. From the results of the 2006 survey it was concluded that there is an environmental inertia within the Swedish building sector, i.e. it is slow.

The sector was struggling with energy aspects and use of non-renewable resources, the companies continue to have a preference for waste management and environmental activities of a managerial kind and they, like in the 2002 survey, perceived that they have gained most results concerning use of hazardous substances and waste management. Companies have put much effort into measures related to EMS. These results raised several questions for the 2010 survey and invite us to study the environmental practice of the construction sectors in a twelve years perspective, i.e. the time frame covered by the three surveys. The following questions are of interest: Did the industry's efforts to develop green building practices contribute to any changes or not? What are the main fields of environmental actions over time? Is it still going slow?

2. Results

Results of this study show that clients together with managers are the most influential stakeholders on companies' environmental work in all three surveys. Also the final customer and the employees are considered as important stakeholders. Further, the owner/shareholders of the company as well as the mother company are stakeholders with an increasing influence. Generally, in 2010 more stakeholders have been identified as influential. Managerial activities that are carried out in the companies are largely related to an environmental management system. For example, in all three surveys, companies' most important activity has been to set up a written environmental policy. Also, they have implemented routines to secure the observance of environmental laws (increase from 74% in 2002 to 88% in 2010), established an order of accountability (increase from 69% in 2002 to 83% in 2006 and stabilized 2010), and formed environmental goals as part of continuous improvements as well as measurable goals (increasing number from 2002 to 2010). Considering that an overwhelming majority of the companies say that they have set measurable environmental goals still less perform activities that in turn measure the environmental performance. However, this discrepancy has diminished in 2010 where 52% of the companies had indicators to measure environmental performance, in comparison to 2002 with 25% and 2006 with 35%. Waste separation has been the most common measure to reduce environmental impact in Swedish construction industry during the last twelve years. Compared to 2002 and 2006, in 2010 all companies show a higher level of activity concerning all kind of technical measures taken.

Environmental activities have had most and increasing impact from 2002 to 2010 on energy use, waste, and use of hazardous substances. In 2010, environmental activities even have had a considerable impact on use of non-renewable materials, risks of environmental accidents and transports. Similar for all three studies, companies in the building sector consider that environmental activities mostly bring long-term benefits to business or benefits for the principal stakeholders, such as staff, management and owners/shareholders. External obstacles that companies experience as hindering are foremost lack of market incentives, lack of cooperation, no competitive advantages but also lack of technical solutions and no regulatory incentives. This perception has risen quite much since 2002. An internal obstacle that many companies emphasize is that environmental work is too costly, with a significantly increase in 2010. Also lack of educated personnel is mentioned as an obstacle for effective environmental work.

3. Discussion

A comparison between the results from the 2002, 2006 and 2010 survey makes it possible to identify trends and institutionalizing processes that contribute as well as hinder sustainable development within the industry. Generally, three positive trends can be identified. 1) Today, many but still not all companies carry out environmental management activities especially related to EMS. 2) Companies perceive a growing pressure, i.e. interests and expectations, from different stakeholders. 3) The practical environmental activities of a technical nature in the companies are getting more intensive and of greater variety. The results also illustrate quite clear that the Swedish construction sector perceives the environmental work as a consequence of self-regulation rather than as green business opportunities. Green business seem to be a strange phenomenon for the actors in the sector as it is difficult to establish a market if the actors can't offer as green products, innovations, technical development, cooperation with researchers etc. To make a difference and change the attitude and to understand that environmental work can be much more than self-regulation, norms need to be changed.

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Summary

Over the last two decades the Swedish construction sector has made much effort to develop green building practices. This paper is based on results from three questionnaire surveys, carried out in 2002, 2006 and 2010, that investigate environmental attitudes, management and performance in the Swedish construction industry. A comparison between the results makes it possible to identify trends and institutionalizing processes that contribute as well as hinder sustainable development within the industry. The aim of this study is to empirically explore the development of environmental practice over time. The questionnaires are directed to environmental managers or alike at companies within construction, real estate, consulting engineering and architecture with at least 50 employees (20 for architects). The total number of companies included in the survey is 534 in 2002, 542 in 2006 and 458 in 2010. The response rate varies from 41% to 45%. Three general, positive trends can be identified. 1) Many, but still not all companies carry out environmental management activities especially related to an EMS. 2) Companies perceive a growing pressure, i.e. interests and expectations, from different stakeholders. 3) The practical environmental activities of a technical nature in the companies are getting more intensive and of greater variety. The results show that the Swedish construction sector perceives the environmental work as a consequence of self-regulation rather than as a green business opportunity. Green business seems to be a strange phenomenon in the sector, as it is difficult to establish a market without offering green products, innovations, technical development, cooperation with researchers, etc. To make a difference and change the attitude and to understand that environmental work can be much more than self-regulation, norms need to be changed.

Keywords: questionnaire survey, construction industry, environmental attitude, environmental management

1. Introduction

1.1 Field of study

Over the last two decades the Swedish construction sector has made much effort to develop green building practices. Researchers within the field have provided theoretical knowledge on how to design green buildings and analytical environmental management tools have been developed to guide the practitioners. Information campaigns have raised the general environmental awareness

among building practitioners.

In Sweden, a questionnaire survey of the Swedish construction sector has been conducted three times (2002, 2006 and 2010) investigating environmental attitudes, management and performance. Results of the 2002 survey showed that many companies actively worked with environmental issues, many companies educated their personnel, implemented environmental management systems and established environmental policies [1]. The 2002 survey also showed that the sector focused on a few aspects like handling of environmental hazardous substances and waste. Further, companies preferred management measures on an overarching organizational level whilst it was more difficult to achieve acceptance of measures of technical nature within the companies. Another result from the 2002 survey indicated a lack driving forces such as a green market and that companies were better in planning than following up of their environmental work.

Gluch et al. [2] concluded from the survey in 2006 that there is an environmental inertia within the Swedish building sector, i.e. it is slow. The sector was struggling with energy aspects and use of non-renewable resources, the companies continue to have a preference for waste management and environmental activities of a managerial kind and they, like in the 2002 survey [1], perceived that they have accomplished most results concerning use of toxic substances/chemicals and waste management. Companies within the building sector have especially put much effort into measures related to Environmental Management Systems. Gluch et al. [2] reveals five possible reasons to this inertia. First, the notion that the market for green products and services are dysfunctional does not stimulate innovation and new approaches. Second, the lack of cooperative actions between actors involved in the building process limits the possibility to view the products and services out of a holistic perspective. Third, for goals and goal setting to have a motivating effect it is important to provide information of whether one has achieved the goals or not [3]. Fourth, the perception that banks and other financial institutions have little or no effect on the environmental work hinder that the issues are considered on the business agenda. Last but not least, little or no cooperation with R&D departments creates poor foundation for the development of pioneering green ideas, innovative green technique and new green business opportunities.

These experiences raise several questions before the 2010 survey and invite us to investigate the environmental practice of the Swedish construction sectors in a twelve years perspective, i.e. the time frame covered by the surveys 2002, 2006 and 2010. The following questions are of our interest: Did the industry's efforts to develop green building practices contribute to any changes or not? What are the main fields of environmental actions over time? Is it still going slow?

1.2 Aim and scope

The aim of the paper is to empirically explore the development of environmental practice of the Swedish construction sector by examining environmental attitudes, management and performance over time. More specifically the aim is to identify trends of environmental actions and attitudes.

2. Research method and data

2.1 Survey x 3 - questionnaire and data collection

The paper is based on data generated from three structured questionnaire surveys carried out 2002 [1], 2006 [2] and 2010 [4], with the objective to investigate environmental attitudes, management and performance within the Swedish construction industry. The term 'construction industry' is here used in a broad sense, including architects, technical consultants, construction companies and property owners and managers. The general structure of the survey covers the industry's definition of its environmental challenge, attitudes towards this challenge, and the response and performance from environmental measures taken.

The first survey in 2002 was a modified version of the environmental barometer 2001 [5], a questionnaire survey with focus on the producing sector and leaving out the construction sector. In the 2006 survey, minor adjustments were made based on the experiences from 2002 year's survey hanges were made mostly concerning wording, for example, client/customer instead of consumer.

Due to its actuality, in 2006 a section concerning energy declarations directed to real estate firms was added. In 2010, further adjustments were made based on experiences from the previous surveys and because of a changed way of distribution of the questionnaire. The section on energy declarations, questions on background information and general view of sustainable development, as well as questions perceived as repetitive were removed. All three questionnaires were pre-tested on industry representatives. The questionnaire contained a total of 32 questions in 2002, 39 questions in 2006, and 24 questions in 2010. Keeping the questionnaire as intact as possible has been a deliberate move in order to be able to make comparisons over time.

In 2002 and 2006, the questionnaires, were sent out by mail to each company in the statistical population together with an introductory letter and directed at environmental managers or alike. In the 2010 survey, the questionnaire was sent out by e-mail to environmental managers or alike using the online software SurveyMonkey™.

2.2 Statistical population

For all the three surveys the companies were selected from Statistics Sweden's Business register according to the Swedish Industrial Classification industry codes (corresponding to the European industrial activity classification – NACE). The surveys 2002, 2006 and 2010, then, cover all companies with at least 50 employees within technical consultants, building constructors, and property owners and managers, and companies with at least 20 employees within architecture (2006 and 2010). The addresses of the companies were also obtained from the Business register.

According to the Statistics Sweden, in 2002 about 549 companies had a core business that falls into one of these categories, in 2006 it was about 620 companies and in 2010 about 543 companies. However several of these, especially among the technical consultants, did not belong to the building and real estate sector, for example IT consultants and energy suppliers. After a correction the final populations were stated and the questionnaires were sent to, see Table 1. The response rate varies from 41% to 45%.

Table 1 Total number of companies, response and response rates

Year of survey	Total number of companies	Responses	Percentage of answers (%)
2002	534	217	41
2006	542	246	45
2010	458	195	43

2.3 Data analysis

In the surveys 2002 and 2006, the data has been entered manually, stored in and analysed by using the statistical data programme SPSS®. In the 2010 survey, the data was entered by the respondents directly in the database of the online software SurveyMonkey™. From there, the data has been exported and analysed in SPSS®. In order to secure reliability and validity of the study a statistician has been consulted both during data collection and analysis.

3. Results

3.1 Perceived environmental problems - Stakeholder pressure

Clients together with managers are the most influential stakeholders on companies' environmental work in all three surveys (Table 2). Also the final customer and the employees are considered as important stakeholders. Further, the owner/shareholders of the company as well as the mother company are stakeholders with an increasing influence. Generally, in 2010 more stakeholders have been identified as influential.

Seen out of an environmental research as well as environmental knowledge perspective, we notice in the 2002 and 2006 survey a very low influence on the companies' environmental work that researchers, environmental organizations, mass media and politicians are assumed to have. However, in 2010 the trend has changed and all these stakeholders are assumed to have increasing influence. Other stakeholders, worth to be mentioned, are unions and local citizens/groups which had very little importance for the companies' environmental work in the 2002 and 2006 survey but were perceived as quite influential in 2010.

In all three surveys neither financial actors, such as banks, insurance companies and financial analytics nor controlling instances such as accountants are perceived as influential on the companies' environmental work.

Table 2 Companies' rating of stakeholders' influence on environmental activities in the company

	2002 (%)	2006 (%)	2010 (%)
Managers	49	50	52
Customer/client	52	51	50
Final customer	40	38	43
Employees	38	31	39
Owners/Shareholders	31	30	37
The mother company	28	21	33
National authorities/regulators	22	27	22
Trade associations	21	19	20
Politicians	-	7	18
Local citizens/groups	2	4	18
Environmental organizations	9	8	17
European regulators	7	15	17
Unions	7	4	15
Competitors	19	17	14
Research institutions	6	3	13
Consumer/tenants	15	15	12
Suppliers	14	15	12
Mass media	7	5	12
Accountants	5	9	8
Insurance companies	2	3	4
Banks	1	1	3
Financial analytics	-	1	1

3.2 The companies' response to the environmental challenge,

The companies' response towards their environmental challenge can take different expressions; employing personnel and create environmental working groups, carrying out managerial as well as technical measures are some examples.

3.2.1 Staffing and environmental personnel

A majority of the companies have some kind of personnel that handles environmental issues within the company and the number has increased from 75% in 2002 to 81% in 2006 and 83% in 2010. Still, in 2010 there are about 17% of the companies without personnel or department that handles environmental issues. Most respondents answered in 2002, 2006 and 2010 that the number of environmental personnel has been the same during the last four year period (Table 3). In 2002 the number of environmental personnel was increasing fairly or much in the companies, in 2006 it had stabilised in to a level of approximately one person per company. In 2010 the number of environmental personnel was again increasing fairly or much in the companies.

Table 3 Changes in number of environmental personnel during the last four years period

	2002 (%)	2006 (%)	2010 (%)
Decreased much	1	1	0
Slightly decreased	6	7	4
No change	45	67	56
Slightly increased	30	18	29
Increased much	18	6	11

How influential the environmental work is in the company is partly connected to which formal position the environmental manager has. The 2010 survey shows that half of the environmental managers (50%) are members of the board which is a considerable increase comparing to 2006 when 34% and 2002 when 43% did and indicates that the environmental issues are after a declining in 2006 on the way to be handled as a regular part of the companies work.

All the respondents in the 2010 survey think they have, at least partly, enough knowledge in order to influence practice (85% in 2006 and 88% in 2002) or strategic decisions (97% in 2010, 85% in 2006 and 76% in 2002). The relatively large share of the respondents in 2002 (28%) and 2006 (25%) which were not in a position that they have authority to stop environmentally damaging processes and/or influence strategic decisions decreased to less than 10% in 2010. Thus, the discrepancy between knowledge to influence and actual authority to do so is condensed.

3.2.2 Managerial measures

The environmental work in many of the companies within the construction sector work in accordance with an environmental management system (EMS), more or less with the same comprehension in 2010 and 2006 (70% respectively 73%). But this is a large increase since 2002 when 46% had an EMS.

Table 4 shows that the managerial activities that are carried out in the companies largely are related to the EMS. For example, in all three surveys, companies' most important activity has been to set up a written environmental policy. Also, they have implemented routines to secure the observance of environmental laws (increase from 74% in 2002 to 88% in 2010), established an order of accountability (increase from 69% in 2002 to 83% in 2006 and stabilized 2010), and formed environmental goals as part of continuous improvements as well as measurable goals (increasing number from 2002 to 2010).

Table 4 Environmental management activities related to the EMS

	2002 (%)	2006 (%)	2010 (%)
Written environmental policy	91	93	94
Routines to secure the observance of env. laws	74	81	88
Measurable env. goals	69	76	84
Established an order of accountability	69	83	83
Env goals as a part of continuous improvements	71	80	82
Plan of action to achieve env. goals	-	71	80
Env considerations integrated in strategic decisions	-	72	77
Environmental audits	49	64	70
Env. training program	67	65	67
Initial environmental review	75	71	67
HSE data annual report	36	50	61
Environmental indicators to measure env. performance	25	35	52
Benchmarking	25	26	39
Separate HSE report	21	23	26

Considering that an overwhelming majority of the companies say that they have set measurable environmental goals still less perform activities that in turn measure the environmental performance. However, this discrepancy has diminished in 2010 where 52% of the companies had indicators to measure environmental performance, in comparison to 2002 with 25% and 2006 with 35%. Also, environmental audits are on the way to be applied more frequently (49% in 2002 and 70% in 2010). The importance of an initial environmental review is decreasing both in ranking and percentage (ranking 3 in 2002 and 10 in 2010).

Besides activities related to the EMS the companies foremost carry out activities that aim at transferring environmental information and demands between actors that takes part in the supply chain (Table 5). Another communicative move is to develop checklists and guidelines.

Table 5 Environmental management activities related to purchasing and market

	2002 (%)	2006 (%)	2010 (%)
Env. demands on suppliers	79	87	76
Env. evaluation of suppliers	76	81	73
Implementation of checklists & guidelines	51	63	
Implementation of material guidelines			56
Implementation of checklists			74
Env. information to customers	46	50	47
Building product declarations	-	50	24
Environmental declarations	-	44	36
Energy declarations	-	35	51
Cooperation projects	33	24	53
Eco-labelling	14	14	23
Use of LCA	15	14	32
Green marketing	11	8	20

3.2.3 Technical measures

Waste separation has been the most common measure to reduce environmental impact in Swedish building industry during the last twelve years (Table 6). Compared to 2002 and 2006, in 2010 all companies show a higher level of activity concerning all kind of technical measures taken. In 2002 and 2006 many of the companies emphasised energy as a major problem for the sector to handle, however there were a low percentage of companies acting to reduce the energy use. In 2010, energy reduction in production and by transports is performed by 85% of the companies. Also, in 2010 there is a change from being devoted to handle already generated waste to performing waste minimising measures and recycling measures as it was in the previously years. Environmental projects are getting more popular within the companies as well as space management and implementation of cleaner technology.

Table 6 Environmental activities of a technical nature in the companies.

	2002 (%)	2006 (%)	2010 (%)
Waste separation	87	90	95
Material recycling within the company	62	62	86
Reduced energy use of transports	49	52	85
Reduced energy use in production	35	45	85
Actions to reduce solid waste	54	67	84
Reduced travelling		34	83
Environmental projects re. products/services	55	57	82
Substitution of hazardous inputs	63	75	81
Substitution of non-renewable materials	37		76
Reduced energy use of products/services	42		75
Implementation of cleaner technology	34	41	67
Reduced material use of products/services	32	32	67
Space management	35	38	66
Actions to reduce emission to air	43	40	64
Actions to reduce noise	44	35	59
Reduced water use in production	19	21	51
Selective demolition	46	41	49
Green open spaces to foster biological variety		18	41
Actions to reduce emission to surface water	15	14	31
Re-use of waste from other companies	12	9	29

3.3 Results from the companies' environmental activities

An indication of the success of the environmental work is obtained by looking at what extent environmental activities have had effect on environmental performance and business.

3.3.1 Environmental improvements

Environmental activities have had most and increasing impact from 2002 to 2010 on energy use, waste, and use of hazardous substances, the last one on more or less the same level as 2006 (Table 7). In 2010, environmental activities even have had a considerable impact on use of non-renewable materials, risks of environmental accidents and transports.

Table 7 Effect of environmental activities on environmental problems

	2002 (%)	2006 (%)	2010 (%)
Use of energy	20	25	49
Waste	24	36	40
Use of hazardous substances	29	33	32
Use of non-renewable resources	11	15	30
Risk of environmental accidents	9	20	27
Emissions to air	11	15	19
Use of water	10	13	17
Contaminated soil	7	7	13
Noise	4	9	10
Landscape damage	2	2	8
Smell	3	3	6
Waste water	6	6	5

3.3.2 Business effects

Similar for all three studies, companies in the building sector consider that environmental activities mostly bring long-term benefits to business or benefits for the principal stakeholders, such as staff, management and owners/shareholders.

Table 8 shows that a majority of the companies answered in all three surveys, that the environmental activities have had a positive impact on especially company image, whereas environmental activities have had a negative impact on short-term profits, cost savings and productivity. The effect on the competitive advantage has been the same during the whole period, however its ranking dropped from 4 (2002 and 2006) to 7 (2010). It is noticeable that bureaucracy, a new activity added in the 2010 survey, is by far considered having the most negative impact (33%).

Table 8 Effect of environmental activities on business (positive/very positive)

	2002 (%)	2006 (%)	2010 (%)
Company image	74	79	85
Pleased personnel	61	69	77
Pleased management	67	63	78
Long-term profit	56	52	64
Pleased owners/shareholders	53	55	63
Product image	46	49	61
Competitive advantages	58	58	58
Cost savings	39	45	52
Sales	43	40	48
Recruitment	33	33	47
Market advantages	39	36	44
Market shares	33	26	36
Productivity	19	18	27
Short-term profit	15	15	27
Improved terms of insurance	9	12	14
Improved terms of bank loans	6	6	12

3.4 Obstacles and attitudes

Obstacles for carrying out an effective environmental work can be divided into internal and external obstacles, where the external are out of the company's immediate control and the internal are easier for the company to have an effect on.

External obstacles that companies experience as hindering are foremost lack of market incentives, lack of cooperation, no competitive advantages but also lack of technical solutions and no regulatory incentives (Table 9). This perception has risen quite much since 2002. An internal obstacle that many companies emphasize is that environmental work is too costly, with a significantly increase in 2010. Also lack of educated personnel is mentioned as an obstacle for effective environmental work.

On an overall level, the construction sector experiences that obstacles are more pronounced now than four years ago (up to 50%), which is an enforced trend since 2006 where obstacles were perceived between 5 and 10% more compared with 2002.

Table 9 The extent, which obstacles have influenced environmental activities in the companies (little/some/quite much/much), in brackets figures for perceived obstacles as much/very much

Obstacles		2002 (%)	2006 (%)	2010 (%)
external	No demand for green products/services	62 (24)	74 (24)	83 (29)
	Lack of willingness to cooperate from customer	57 (9)	61 (11)	80 (13)
	Lack of willingness to cooperate from suppliers	60 (7)	63 (11)	80 (11)
	No competitive advantages	59 (21)	74 (31)	80 (30)
	No technical solutions available	56 (9)	62 (8)	79 (13)
	No regulatory incentives	57 (12)	53 (16)	79 (16)
	Lack relevant information	-	61 (8)	71 (10)
	Lack of clear regulations	60 (14)	61 (13)	70 (6)
	Lack of reliable information	51 (7)	61 (6)	69 (8)
	Lack of willingness to cooperate within the sector	47 (8)	55 (10)	67 (10)
	No regulations	44 (8)	43 (9)	64 (12)
Cultural heritage demands	-	31 (3)	48 (7)	
internal	Lack of educated personnel	70 (15)	76 (10)	88 (14)
	Lack of knowledge on available tools	62 (9)	73 (10)	86 (9)
	Too costly	61 (18)	73 (19)	86 (26)
	Lack of financial resources	60 (12)	62 (14)	76 (15)
	Communication difficulties	-	59 (13)	70 (6)
	Insufficient organizational structure	-	63 (15)	67 (12)
	Lack of management support	50 (12)	57 (13)	60 (11)
	Counteracting organizational structure	-	43 (8)	59 (6)
	Organisational difficulties	67 (15)	-	-

4. Discussion and conclusion

A comparison between the results from 2002, 2006 and 2010 makes it possible to identify trends and institutionalizing processes that contribute as well as hinder sustainable development within the construction industry. The survey enables us to see whether the industry's efforts to develop green building practices have contributed to any changes or not.

Out of the results, three general, positive trends can be identified. 1) It is obvious that environmental management activities, and especially related to an EMS, today are in many companies, but still not all, a common and an integrated part their environmental work. 2) It is also obvious that companies perceive a growing pressure, i.e. interests and expectations, from different stakeholders. This is in line with the first survey where the respondents expressed a belief in an increasing stakeholder influence in the future. 3) It is apparent that the environmental activities of a technical nature in the companies are getting more intensified and of greater variety, i.e. not only focus on a few aspects such as waste management or handling of hazardous substances.

The results of the three surveys illustrate quite clear that the Swedish construction sector perceive the environmental work as a consequence of self-regulation (follow ISO standards, guidelines, etc) rather than as green business opportunities. This belief in self-regulation seems to be a kind of taking responsibility for society instead of shaping green business. The increased stakeholder pressure could also be interpreted as compensation for democratic insight in national regulation when self-regulation is pertained. Similarly, the understanding that environmental work mainly gives benefit to improved company image and is costly also supports the prevailing argument that environmental work follows the logic of self-regulation. The question is, why should be there a lack of green business potentials within the construction sector either in the nature of eco-efficiency/resource efficiency (should lead to short-term profit which the respondents not really can see) or green product development. Possibly, the companies are getting more interested in green marketing when self-regulating activities gets more bureaucratic? What can they win by cementing their belief in self-regulation? Green business seem to be a strange phenomenon for the actors in the sector – it is difficult to establish a market if the actors can't offer anything such as green

products, innovations, technical development, cooperation with researchers etc.

Finally, to make a difference and change the attitude of the actors in the Swedish construction sector and to understand that environmental work can be much more than self-regulation, norms need to be changed – and this can be done in many different ways!

4.1 Some comments on validity and reliability of the study

There is always a risk in surveys that intend to measure peoples' attitudes and values that the respondents may answer as they believe they should answer and/or tries to place themselves and their companies in a favourable light. It is therefore important to acknowledge that these surveys do not present an objective truth about the companies' environmental work but rather measure what the respondent perceive as their environmental challenge, problems and so forth. There is also a risk, since the survey, is directed to environmental managers, that they in general have a larger interest in environmental aspects and therefore is not representative for the overall values within the company.

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