

Magazine Publishing: Editorial Process Structure and Environmental Impacts – A Case Study

Malin Picha, Swedish Media Publishers' Association, Box 22500, 104 22
Stockholm, and KTH Royal Institute of Technology, School of Computer Science
and Communication, Department of Media Technology and Interaction Design,
Centre for Sustainable Communications, 100 44 Stockholm, Sweden.
picha@kth.se

Mohammad Ahmadi Achachlouei, KTH Royal Institute of Technology, School of
Architecture and the Built Environment, Division of Environmental Strategies
Research, Centre for Sustainable Communications, 100 44 Stockholm, Sweden.
mohammad.achachlouei@abe.kth.se

Åsa Moberg, KTH Royal Institute of Technology, School of Architecture and the
Built Environment, Division of Environmental Strategies Research, Centre for
Sustainable Communications, 100 44 Stockholm, Sweden.
asa.moberg@abe.kth.se

Keywords: media, workflow, editorial process, environmental impact,
content production.

Abstract

This study investigates the structure of the editorial processes at a Swedish monthly magazine for interior decorating and design, *Sköna hem*, and assesses the carbon footprint (greenhouse gas emissions) of the editorial content production during one year. The objective is to define the processes using a computer based process modeling tool and to analyze the workflow in order to discover how the different steps in the production process relate to different environmentally related parameters. An additional objective is to present the carbon footprint of the overall editorial work and to identify the major reasons for greenhouse gas emissions, as well as any major data gaps and uncertainties. Semi-structured interviews were undertaken in order to identify the process steps involved in the content production. Environmentally related parameters, such as travel distance, mode of transports, and computer hours, were then collected

for each process step. Life cycle assessment methodology was used to assess the potential greenhouse gas emissions of the editorial work at *Sköna hem*.

A number of process steps were identified in the content production. Three overall phases were identified, into which the process steps can be grouped. Firstly, the *planning phase* consists of meetings with different key persons in order to plan the content of the next issues of the magazine. Secondly, *the executive phase* was identified. Here, all the articles and pictures are produced. Thirdly, *the assembly phase* includes text editing and page design. Finally, ready-made pages are sent to printing or to the digital publishing channels such as tablets and the web.

According to the assessment made, the editorial content production at *Sköna hem* has a carbon footprint of 23 tons of carbon dioxide equivalents per year. The major reasons are the manufacturing of computers and screens used at the office, business trips by plane, and transports by delivery firms mainly used for transporting furniture and other objects to and from photo sessions. The use of computers and screens is mostly associated with the *assembly phase*, business trips by plane with the *planning phase* and transports by delivery firms with the *executive phase*.

1. Introduction

1.1 Background

Media companies operate in a dynamic environment where change is a constant. Pursuing change in a media company implies an opportunity to optimize processes on different levels. In order to meet these opportunities, as well as being proactive when it comes to environmental performance, we need to understand the current structure of media companies, for example when it comes to work processes. Better understanding can lead to finding ways to optimize the workflow and to implement other improvements.

According to Achtenhagen (2007), organizational structures at media companies will be even more complex in the future, due to consolidations and changes in the media landscape. At a time where many media companies struggle with their financial performance, it might be worthwhile for them to review their organizational practices in order to improve performance (Achtenhagen 2007). Different incentives to facilitate environmental improvements are also likely to become more common, and a proactive media company needs to consider and act upon its environmental performance (Teljas et al. 2007). Globally, the entertainment and media sectors account for a couple of percent of the total carbon dioxide emissions (Malmodin et al. 2010).

Several studies on the environmental impact of media products have been undertaken during the past years, some of which compare environmental impact from printed and electronic versions (Gard & Keoleian 2003, Kronqvist et al. 2010, Moberg et

al. 2010, Moberg et al. 2011, Reichart & Hirschier 2008, Toffel & Horvath 2004). In many of these studies of media product systems, the content production part has not been extensively studied. However, a study of editorial processes and environmental impact at a local newspaper company in Sweden was published recently (Picha & Moberg 2011).

On a general level, paper and pulp, distribution, and printing are responsible for the largest part of the total environmental impact from the production of printed magazines (Boguski 2010, Kronqvist et al. 2010). For electronic versions of the magazine, the manufacturing of the computer used for reading is crucial when it comes to the environmental impact (Kronqvist et al.) However, Kronqvist et al. note that the editorial work processes involved when producing media content also contribute to the total environmental impact. The relative importance of the content production from an environmental perspective may grow when more magazine readers change from printed media to reading content electronically, for example on tablets and other mobile devices. Consequently, research in this field is important in order to get a good understanding of the structure, work processes and possible improvement options regarding the reduction of environmental impact.

1.2 Objectives

This study investigates the structure of the editorial processes at a Swedish monthly magazine for interior decorating and design, *Sköna hem*. By editorial processes we mean all work steps included in producing editorial content for the printed and the electronic versions of the magazine, not including the sales and production of advertisements, and not including premedia, printing and distribution. The objective is to identify the major editorial processes and to visualize the workflow in order to discover how the editorial processes could be optimized and how this in turn may affect the environmental impact. An additional objective is to present the carbon footprint of the content production of the magazine and to identify the major reasons for this climate change impact as well as presenting any data gaps and uncertainties.

1.3 The studied company

Sköna hem is one of Sweden's oldest, still existing interior design magazines. The magazine was first published in 1979 by an editor at the weekly magazine *Vecko-journalen*. The publishing group was Åhlén & Åkerlund, owned by the Bonnier group. At that time, there was not any existing magazine with focus on interior design and furniture in Sweden. *Sköna hem* was considered something completely new, and in 1979 the editor received a prize, *Stora Journalistpriset*, which is considered one of the most prestigious prizes for journalists in Sweden (www.bonnier.se).

The Bonnier group has ever since then dominated the market within the segment of specialized magazines like *Sköna hem*. During the 1990's, the segment for "homes, housing and gardening" doubled, when considering the number of copies (Hadenius & Weibull 2003). Bonnier then controlled one third of the total yearly circulation within this segment. The closest competitor of *Sköna hem* – *Allt i Hemmet* – also belongs to the Bonnier group. In 1992, *Allt i Hemmet* and *Sköna hem* merged into one magazine, and in the year 2000 they were divided into two magazines again (Gustafsson et al. 2002). According to the editor-in-chief, *Sköna hem* has always maintained its original concept, which consists of three parts: trends, traditions and quality. He states that it is important to be contemporary, but at the same time contemporary in a good measure. "Time, taste and fashion change, but not *Sköna hem*. We build our magazine on a serious interest for interior decorating, combined with serious know-how" (www.bonnier.se).

In 2010, the circulation of *Sköna hem* was 93 400 copies. *Sköna hem* publishes 14 issues per year, and has a reach of 407 000 readers (Orvesto Konsument, www.tns-sifo.se). An average issue has approximately 202 pages, but the number of pages varies considerably during a year. The average number of pages with editorial content was 113 per issue in 2010. Besides the printed magazine, *Sköna hem* also publishes editorial content on the web and in a tablet version. The web version has a reach of 25 500 unique web users per week (Kia index Internet 2011). The reach of the tablet version is not official. In 2010, the turnover of *Sköna hem* was 7.95 million Euro, or approximately 11 million US dollars (Blom 2011).

In 2011, the magazine had 13 full-time employees (FTE) and two employees working 90 percent each, based in the office in Stockholm. Out of these, three employees worked with administration, six employees belonged to the editorial staff and their work ranged from text editing, page design, writing smaller or larger home decorating articles, to being one of several managers, and six employees were interior decorators or assistant interior decorators. Consequently, some of the staff had a design-oriented background, while others had a journalistic background. *Sköna hem* also arranges courses in interior decorating for their readers, but this work is not included in this study of work processes. In addition to the editorial staff based at the office, *Sköna hem* cooperates with a large number of freelancers, of which some are photographers and some are writing journalists. Some freelancers are engaged very often and others more infrequently.

Sköna hem has previously not been involved in any environmental work. On a central level, the Bonnier group has worked with environmental questions since 1999, when an environmental council started, involving three of the Bonnier group's daily newspapers.

2. Methods and limitations

2.1 Methods

In this study, semi-structured interviews were undertaken with the editor-in-chief at *Sköna hem* during May, June and December 2011 in order to identify the process steps involved in the editorial content production. These interviews resulted in an overview of the process steps and how they act together to form a content production process where the end product is content for the monthly magazine. The information gained from the interviews was analyzed, using the computer based process modeling program AIO WIN.

Environmental data was then collected for each process step, and this data was assigned to the different process steps in the workflow. For each process step, the following environmentally related parameters were considered:

- travel (distance, amount of people, mode),
- computer hours for laptops,
- computer hours for stationary computers,
- use of office material,
- use of other equipment,
- electricity use,
- meeting room hours,
- use of the editorial computer system,
- transport of goods,
- use of delivery firms,
- person hours.

Using life cycle assessment methodology, an assessment of the carbon footprint of the editorial work during 2010 was performed. Life cycle assessment (LCA) is an environmental assessment method for considering various potential environmental impacts, including resources used, throughout the whole life cycle of a product or a service, including raw material acquisition, production, use, and disposal or recycling (Baumann & Tillman 2004). In this particular study, the focus was on greenhouse

gas emissions (the carbon footprint) and the system boundaries were set to study the editorial work, meaning all processes related to producing editorial content for the printed and electronic versions during one year, including administration. The carbon footprint is presented on a more general level for *Sköna hem*, and not for each separate process step.

2.2 Inventory of data for the carbon footprint

The inventory of data was based on information for 2010 from the editor-in-chief at *Sköna hem*, and on specific data from different actors in the value chain as well as generic data from the LCA database Ecoinvent 2.2 (Frischknecht et al. 2007). The studied system for editorial content covers the electricity use at the office, heating and cooling of the office, business trips, transports by delivery firms, electronic devices and office paper used during the content production at *Sköna hem*. The environmental impacts related to the advertisement in the magazine were not included in the study.

We used an allocation approach in our assessment. In practice, this is based on the assumption that electricity use at the office, as well as heating and cooling, the use of electronic devices and office paper are split equally among the fulltime employee-equivalents. The environmental impact related to employees not working directly with the magazine is not considered in the study. Moreover, we assume that business trips, transports and photography sessions are not related to the employees who are only working with courses in interior design. For freelancers, we have assumed that they use the same amount of electricity, heating, cooling, office paper and electronic devices as an average employee. The freelancers' taxi trips are already included in the inventory data provided by *Sköna hem*. More details about the inventory data for the carbon footprint calculations can be found in Appendix 1.

2.3 Limitations

This study is limited to the editorial processes at the Swedish monthly magazine *Sköna hem*. By editorial processes we mean all work steps included in producing editorial content for the printed magazine, the web version and the tablet version, independent of the publishing platform. In this study we have not included the sales and production of advertisements, nor marketing, premedia, printing or distribution. The environmentally related parameters in the process steps are to some degree uncertain, since they are based on estimations made by the editor-in-chief, and not on any written sources. More details about the limitations of inventory data for the carbon footprint can be found in Appendix 2.

3. Results

3.1 Results of the process structure analysis

On a general level, work at a monthly magazine is done in cycles, with main focus on the next issue. At the same time, a lot of work preparing future issues is taking place continuously. As an example, the work at the magazine is very dependent on seasons. If a freelance journalist visits a certain home in order to write about the interior design there, and the photographer takes pictures of the garden and the exterior of the house, then the pictures must correspond to the actual season at the time of the publication. It would be very strange if the magazine published winter pictures in the summer, or vice versa.

A large proportion of the articles are written long in advance, and it is important that they are published during the corresponding season. As a result, a monthly magazine is usually working in parallel with a long and a relatively short perspective, which in turn affects the process structure. In figure 1, an attempt is made to illustrate the work rhythm at a monthly magazine. However, it is problematic to measure this in exact figures. Consequently, this just serves as an illustration.

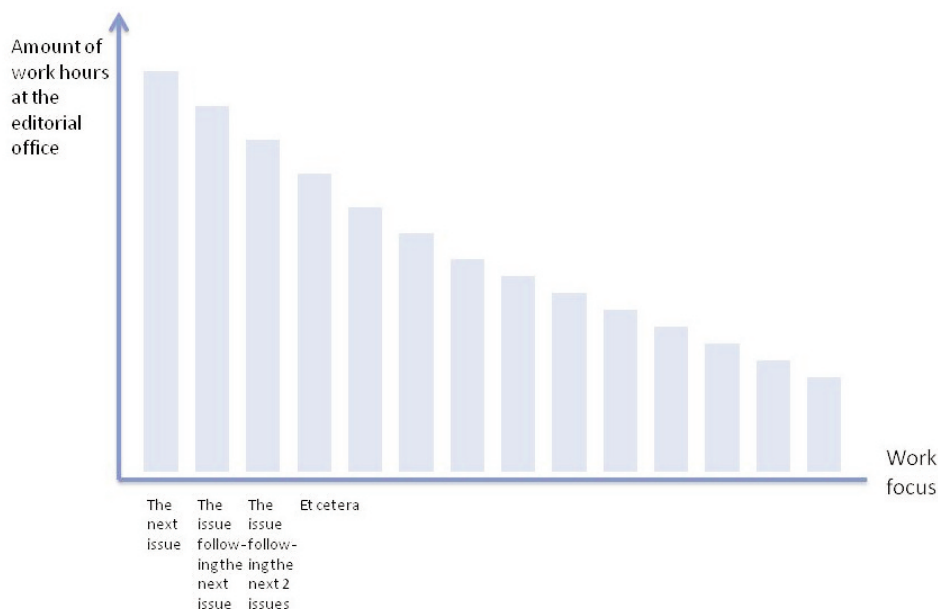


Fig. 1. A monthly magazine is usually working in parallel with a long and a relatively short perspective, with focus on all 14 issues in the coming year. In this figure, an attempt is made to illustrate this working approach. The estimations are based on discussions with the editor-in-chief.

Compared to a daily newspaper, the production time (premedia and printing) of a monthly magazine is very long – approximately five to eight weeks from sending the designed pages to printing, until the magazine reaches the subscriber or the

vendor. This fact places high demands on the managers at the magazine when it comes to the ability to plan both coming articles and the freelance journalists' and staff's work. A considerable amount of the managers' working time is spent planning and logging articles, in order to ensure that every issue consists of the adequate material. According to the editor-in-chief, this planning is mainly done manually on paper, and sometimes with the help of the computer based program Excel. This work method has serious limitations, since it restricts the coordination and communication of the plans.

In this study, a number of process steps were identified in the editorial production. Each process step consists of a number of activities, which are described, along with their inputs, outputs, and control mechanisms. Three overall phases, into which the process steps can be grouped, were identified, see figure 2. Firstly, *the planning phase* consists of meetings with different key persons in order to plan the content of the coming issues of the magazine. Secondly, *an executive phase* was identified. Here, all the articles and pictures are produced, ranging from visits to designed homes in different parts of the country to writing articles about interior designs of different kinds. Some articles include pictures taken in photo studios where large or small interior decorating environments have been constructed. Thirdly, *an assembly phase* includes text editing and page design. In the third phase, advertisements come in from an external ad producer and are placed on the dedicated magazine pages before sent to the page designer. Finally, ready-made pages are sent to printing or to the electronic versions on tablets and the web.

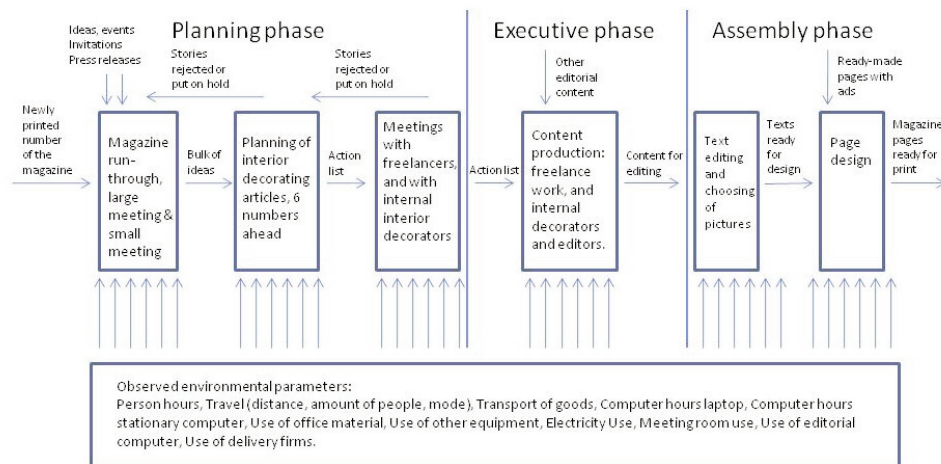


Fig. 2. The central process steps in the editorial content production at Sköna hem. For all process steps, a number of environmentally related parameters were considered.

An earlier case study (Picha & Moberg 2011) looks into content production at a daily newspaper. Compared to the studied newspaper, less time is spent on *the planning phase* at the monthly magazine if we compare the total time spent on planning with the total amount of time spent in all processes. The two case studies

show that 14 percent of the total time at the newspaper is spent on planning, while approximately 4 percent is spent on planning at the magazine. However, the editorial staff at the magazine is faced with a more complex planning situation, since they do not only plan for the next issue, but for all issues in the coming year. The process steps are organized in a repetitive way in monthly cycles, and at the same time in yearly cycles.

Figure 3 illustrates how the total amount of person hours is distributed between the different process steps when looking at one issue of the magazine. From a process perspective, 43 percent of the total amount of person hours is spent on *freelance work*, which is part of the process step called *content production*. Included in the freelance work are for example: travelling to the designed home which will be described in a particular article or to the photo studio where pictures of furniture will be taken, as well as performing interviews, and arranging, styling and taking pictures, doing research about furniture, such as design facts and prices, writing texts and sending the material to the magazine editors.

The other part of the process step *content production*, which also takes up a considerable part with regards to the total amount of person hours, is *work by internal editors*. This takes up approximately 27 percent of the total amount of person hours. *Text editing & choosing pictures* and *page design* take up approximately 13 percent each. The processes that we have studied correspond to a total of 19 fulltime employees, including freelance journalists and photographers.

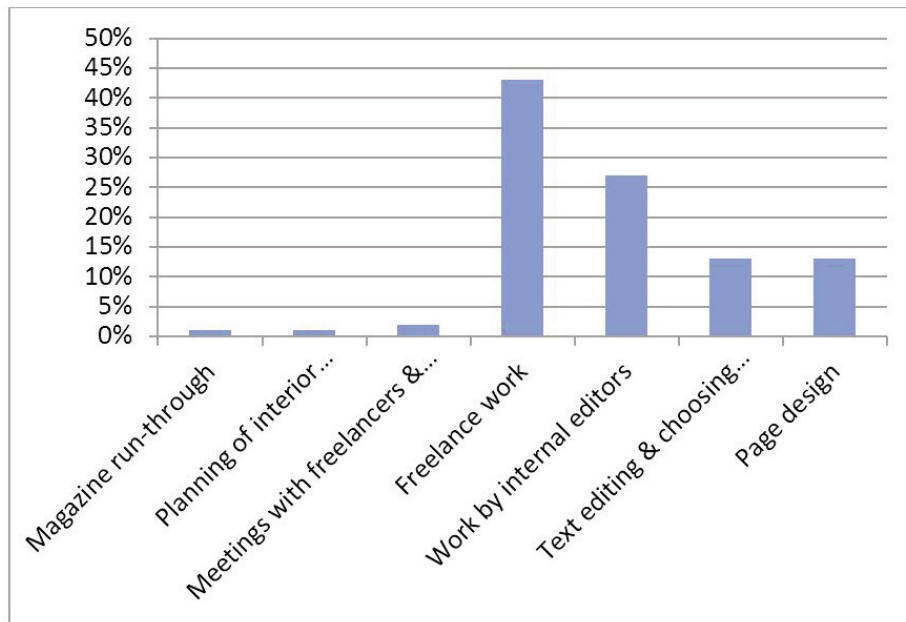


Fig. 3. The percentages of the person hours that each specific process step has in relation to the total amount of person hours in all process steps. The process step of content production has been divided into two parts: freelance work and work by internal editors.

3.2 Results of the study of environmental parameters

When it comes to the environmentally related parameters of the content production at *Sköna hem*, a considerable part of the activities contributing to environmental impact is found in *the executive phase*. These activities include travel by reporters, freelance journalists, and photographers and transports by delivery firms mainly used for transporting furniture and other objects to and from photo studios.

Travel is mainly done within the process steps of freelance work and work by internal editors. Most of these trips are relatively short, within the Stockholm area, but there are a number of trips that go to other parts of the country. Whenever it is possible, *Sköna hem* is striving to coordinate these freelance trips so that one trip to a certain part of Sweden can result in several articles, in order to save time, money and keep down potential environmental impact. In *the planning phase*, one yearly trip in particular affects the overall environmental impact. That is the yearly trip to the furniture fair in Milan, Italy, which usually five to seven people from the editorial staff attend. Some of the editorial staff also makes occasional trips to Paris, France, which is also included in the impact assessment.

Computer use is not evenly distributed between the process steps. Computers are partly used in *the planning phase*, but a majority of the computer use can be found in *the assembly phase*, with work such as text editing, choosing of pictures in digital format and page design in computerized design programs. *The assembly phase* is very computer intense compared to for example *the executive phase*, where a majority of the time is spent out “in the field” or in photo studios arranging interior designs or taking pictures of furniture.

To summarize, the major reasons for environmental impact in *the planning phase* are computer use, electricity use, and the yearly trips abroad. The major reasons for environmental impact in *the executive phase* are travels by car, and transportation of furniture by delivery firms. The major reasons for environmental impact in *the assembly phase* are computer use and electricity use.

3.3 Carbon footprint results

Figure 4 presents the potential greenhouse gas emissions associated with different activities in the editorial content production of *Sköna hem*, with a total of approximately 23 tons of carbon dioxide equivalents per year. As illustrated below, the greenhouse gas emissions associated with business trips (6.3 tons of carbon dioxide equivalents per year), electronic devices (5.7 tons of carbon dioxide equivalents per year), and transportation/deliveries (3.5 tons of carbon dioxide equivalents per year) dominate the activities.

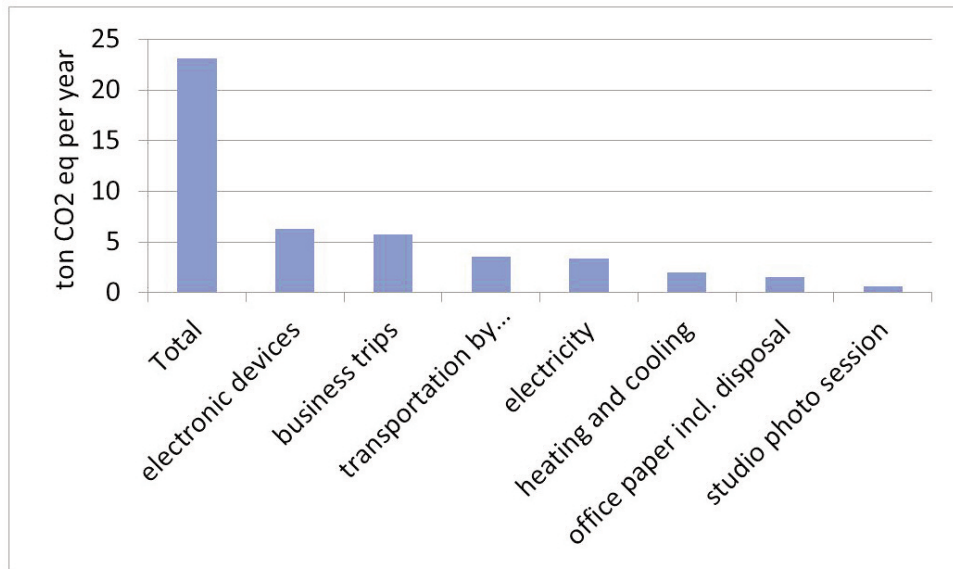


Fig. 4. Greenhouse gas emissions (carbon dioxide equivalents) associated with the magazine's editorial content production in 2010.

More than 90 percent of the greenhouse gas emissions of business trips are associated with flights for the purpose of editorial work, even though the *Sköna hem*-staff makes relatively few flight trips per year. Regarding electronic devices, emissions mainly come from the production of desktop computers (41 percent) and the production of LCD flat screens (51 percent). For delivery transports, about 75 percent of the emissions are associated with transports by car and 25 percent by trucks.

4. Discussion

It might be fruitful to compare the 23 tons of carbon dioxide equivalents per year caused by the editorial content production of *Sköna hem* to other parts of the magazine production. Kronqvist et al (2010) estimate that content production of an average Swedish magazine accounts for 16 percent of the total emissions from magazine production, including printing and distribution. In a study of the magazine *National Geographic*, the editorial work was 1.5 percent of the carbon footprint (Boguski 2010). The difference could be a result of *National Geographic's* larger circulation and other differences in the production process.

In our case study, the greenhouse gas emissions from editorial content production are 8.1 kg carbon dioxide equivalents per page (2828 magazine pages per year) if we allocate the editorial work only to the printed magazine, and not to the electronic versions. In relation to the employees, the carbon footprint is 1.1 ton per fulltime employee and year. When dividing up the total of 23 tons of carbon dioxide onto the readers of *Sköna hem*, each reader is responsible for 21 grams of carbon dioxide equivalents originating from editorial content production. The total yearly consumption

of an average Swede has been estimated to cause approximately 10 tons of carbon dioxide equivalents (The Swedish Environmental Protection Agency, Naturvårdsverket 2008).

The carbon footprint results presented here are of course very specific for *Sköna hem* and dependent on the context in which this magazine exists. However, the result of this study is interesting on a general level, since most of the parameters for editorial work are the same for all magazines of this kind. The processes in themselves can be regarded as representative for all magazines. However, the environmental impact of magazines may to some extent differ depending on the focus of their content. The interior design articles of *Sköna hem* demand a lot of transportation of furniture, but less flight trips than for example a travel magazine.

The Swedish conditions for electricity are quite different compared to other countries. The electricity mix in Sweden is low on greenhouse gas emissions, since it is mainly coming from nuclear and hydro power. The office building of *Sköna hem* is heated with district heating which has a rather low carbon footprint. Consequently, a magazine with another focus and located under different premises would have a different carbon footprint.

In our case study, there are uncertainties regarding the data used in the assessment which need to be considered when interpreting the results. As an example, the number of fulltime employee-equivalents of freelancers is uncertain, and the number probably varies between different years. The carbon footprint of the freelancers' activities is uncertain as well. Also, the lengths of the transports were not known by the delivery firm and have consequently been estimated. In order to be able to improve the calculations of carbon footprints, and also to make the assessments easier to perform, it could be a good idea to keep track of these kinds of parameters and also to ask suppliers to provide this type of information. This could then become an incentive for improvements and a good way to follow up the results.

Being one of Sweden's oldest existing interior design magazines, *Sköna hem* carries a lot of expectations when it comes to content and style. As the editor-in-chief mentioned: Time, taste and fashion may change, but not *Sköna hem*. In general, change may not be imperative as long as work runs smoothly and the readers are satisfied.

However, even in a well-working organization, processes and work habits can be improved. As a suggestion, different types of ICT-based solutions could be suggested to facilitate challenging aspects of the work. One example is a digital calendar, which would help the management team to plan both the next issue and the issues ahead. This would help keep track of the flow of material and ideas in the editorial office. This could become an improvement for the staff, especially when considering the time spent in *the planning phase*.

Such a general planner could for example include sections for all issues in the coming year, with a special sheet for each issue, similar to the structure of Excel. Every sheet would then consist of a list of the planned content of that particular issue, divided up in longer and shorter articles. Depending on for example the length of the article, the number of pictures, and the amount of travel needed, the environmental impact could be indicated in the form of a reference figure based on a rough estimate.

Another ICT-based solution could be a calendar which coordinates freelance work in a way that helps save travel, time and resources, and thereby reduces environmental impact. This calendar could be connected to the general planner, so that management could see environmental impact already at *the planning phase*.

One could argue that the fact that such a considerable part of the person hours are spent by freelance journalists and photographers (see fig. 3) means that the magazine reduces its general control over the environmental impact. The freelance journalists naturally do not report their travel, electricity use or computer use to the magazine. The freelance journalists mainly report their hours spent, in the form of an invoice sent to the magazine. As a result of this system of working, one could argue that *Sköna hem* is pushing a lot of its environmental impact onto the freelancers, thereby leaving out some of its environmental responsibilities.

However, by placing environmental demands on their freelance journalists, *Sköna hem* could take back some of its environmental responsibilities. This could for example be agreements with freelancers to give an account for the travel distance connected to each article, and make an attempt to coordinate local trips, for example with the help of the digital calendar mentioned above.

The environmental focus of the current study was limited to climate change implications. In this study, we calculated the carbon footprint of one year of editorial work. Other possible environmental impacts need to be studied further.

5. Conclusions

This investigation shows that there are a number of process steps involved in the making of the monthly magazine *Sköna hem*. A total of seven main process steps were identified (see fig. 1). These process steps had clearly defined borders, and consisted of a *planning phase*, an *executive phase*, and an *assembly phase*.

In magazine production, the process steps are done both in monthly cycles preparing for each issue of the magazine, but at the same time in longer yearly cycles, where planning and content production are done for all issues within the coming year. This can be concluded as a typical feature of a monthly magazine.

When it comes to the carbon footprint, the major reasons for greenhouse gas emissions are business trips, the manufacturing of the computers and screens used at the office, business trips by airplane and transportation by delivery firms mainly used for transporting furniture and other objects to and from photo studios. The use of computers and screens are mostly associated with the *assembly phase*, business trips by plane with the *planning phase*, and transportation by delivery firms with the *executive phase*.

Acknowledgements

The case study presented here, is part of an interdisciplinary research project undertaken within the framework of the Centre for Sustainable Communication (CESC) at the KTH Royal Institute of Technology. Financial support from Vinnova and partners are gratefully acknowledged. We would like to thank *Sköna hem* and *Bonnier Tidskrifter* for making it possible for us to conduct our study there. Furthermore, we are grateful to professors Nils Enlund, Johan Stenberg and Göran Finnveden for all their helpful support and good advice in this research project, as well as when writing this article.

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Carlsson, Johan, photographer (October 2011)

Kleveland, Bosse, at the delivery firm 2 serve (October 2011)

Nilsson, Stefan, photographer (October 2011)

Appendix 1:

Inventory of data for carbon footprint

Allocation. At *Sköna hem*, some employees are dedicated to purely editorial work while others give courses in interior design and home decorating. In this study, we want to cover the carbon footprint of the content production only. Consequently, some of the collected data needed to be allocated between the different functions provided (magazine and courses). Of the 14.8 fulltime employees (FTE) working in the office, 13.8 FTE are dedicated to the editorial part, including administration, as well as the equivalent of 8 freelancers. In order to account for the greenhouse gas emissions only related to the magazine content production, the data given on electronic devices, office paper, heating and electricity were accounted for by the share of editorial staff (13.8/14.8) and with the freelancers added (7.5/14.8). The delivery transports and photo sessions (the equivalent of 0.5 fulltime freelance photographers) are all allocated to the editorial activities. All business trips are assumed to be for editorial purposes. Moreover, business trips by freelancers (by taxi) are included in the inventory data provided by *Sköna hem*.

District heating and cooling. The office space used for editorial content production is 281 m². Given the figure for average consumption of district heating for the whole building, which is 59 kWh per m² in 2010, the energy use for heating can be calculated: 16600 kWh per year in 2010. Greenhouse gas emissions of district heating, according to the energy company's report, were estimated at 82 g CO₂-eq/kWh in 2010 (Fortum Värme, 2011). The district cooling is 50 kWh/m² and the electricity

used to produce cooling is 0.15 kWh per kWh of cooling. According to the district heating company, Fortum, “green electricity” from hydro power is used (Fortum Värme 2010).

Electricity. The electricity use for the content production of *Sköna hem* was 23 300 kWh in 2010. Data on Swedish average electricity production and distribution was taken from the Ecoinvent database (Dones et al. 2007). The electricity use covers all electricity used at the *Sköna hem* office in 2010, such as lighting, electronic devices and other office equipment.

Office paper. The office paper consumed for editorial purposes was estimated to about 1 ton in 2010. The dataset “Paper, woodfree, uncoated, at integrated mill/RER” from Ecoinvent (Hischier, 2007) was used to model the environmental impacts of the office paper. After use, it is assumed that 85 percent of the waste paper is recycled into new paper. The waste management thus provides an additional function. The system was therefore expanded to include avoided paper production. This avoided paper production was assumed to be newsprint with no deinked pulp, which means newsprint made solely from virgin fibres. Ecoinvent data, as described in Hischier (2007), was used (Paper, newsprint, 0 percent DIP, at plant/RER). These data represent European paper production in 2000.

Production of electronic office equipment. Data for manufacturing including raw material extraction and transportation were taken from the Ecoinvent database (Lehmann & Hischier 2007), which represent European paper production in 2002. To model the LCA screens with various sizes (20, 21, 27, and 26 inches), the Ecoinvent data for LCD flat screen 17 inches were the best option available to choose from. Copy machines were modeled based on printer laser jet. The emissions from the production and transportation of mobile phones were taken into account based on Bergelin (2008). We assumed that mobile phones are charged at the office. The production of the scanner was not modeled. The life time of electronic devices was estimated to three years, according to *Sköna hem*.

Transports of electronic office equipment. The transportation of desktop computers, screens, keyboards, mouse, printers, and copy machines was assumed to be by boat (transoceanic freight ship) from Shanghai to Europe (Rotterdam, the Netherlands) and further to the users in Stockholm by truck (>16 tons). The distance was estimated at 22 222 km by boat and 1470 km by truck. Data on truck and freight ship transportation were taken from the Ecoinvent database (Spielmann et al. 2007).

Business Trips. The business trips (via air and taxi) of the employees and the freelancers have been taken into account. The environmental impacts of three round-trip flights from Stockholm to Paris and seven from Stockholm to Milan are modeled using Ecoinvent data for transport by aircraft in Europe (Spielmann et al. 2007). For taxi trips, the total distance was estimated to about 1200 km for content

production (Blom 2011). Taxi trips were also modeled using Ecoinvent dataset for transport using passenger car in Europe (Spielmann et al. 2007). Most trips are done with public transportation, i.e., buses and subway but these are not covered in the study due to difficulties in estimating the distance, mode and environmental impact.

Transports by delivery firms. Transports are taken into account, based on information from the delivery firm used by *Sköna hem* (Bosse Kleveland, personal communication). There are no specific figures available on distances per delivery, but the average of 3 km per delivery is estimated by the delivery firm. Ecoinvent dataset was used to model the deliveries ordered by *Sköna hem* during 2010; 3068 deliveries by small cars (transport, passenger car/RER) (Spielmann et al. 2007) and 630 deliveries by larger vehicles, such as van or truck (Transport, truck 3.5-7.5t, EURO5/RER) (Spielmann et al. 2007).

Photography sessions. *Sköna hem* has on average 50 indoor photo sessions per year; these can be in a studio or in homes or other premises. In this study, other freelance photographers' activities are handled as other freelancers. The environmental impact of the photo sessions is hard to assess, since there are no readily available data on environmental parameters. Data was gathered through interviewing one photographer who often participates in photography sessions of the magazine (Johan Carlsson, personal communication), and with another ISO-certified photographer involved in previous environmental projects. Included in the modeling of the photo sessions environmental impact are transports, computers and energy use in the studio. For transportation it is assumed that the photographer uses a car, and an average distance within Stockholm area is assumed to be 6 km. European average data from Ecoinvent was used (Spielmann et al. 2007). The production and transportation of desktop computer, LCD screen, keyboard, mouse, and hard disc were modeled using Ecoinvent data (Hischier, 2007). Electricity use was estimated based on the average studio area of 50 m² and average values of 23 kWh/m² for lights, 17.9 kWh/m² for fans, and 9.5 kWh/m² for other real estate (Statens energimyndighet, 2007). The *Sköna hem* photographers mainly use daylight during the sessions. Ecoinvent data was used to model electricity production and distribution in Sweden: "Electricity, low voltage, at grid/SE." For heating 132 kWh/m² (Statens energimyndighet, 2011), Swedish average district heating mix in 2010 was used (Svensk Fjärrvärme, 2010).

Impact assessment: The climate change impact category in the ReCiPe Midpoint (H) method (Goedkoop et al. 2009), as provided in SimaPro 7.3.2, was used to assess the carbon footprint.

Appendix 2:

Limitations

There were limitations in our inventory data required for the assessment of the carbon footprint. For example, data on transports by delivery firms was uncertain. Since data on the travel distance for each delivery was not available, the transportation company had to make a rough estimation, which was used in the assessment. When it comes to the electronic equipment used at the office, there were uncertainties regarding the data for the manufacturing of electronic devices such as computers and screens. Production and waste management data for scanning equipment and photographic equipment was lacking. Waste management of the electronic devices is not considered within the study. Since the detailed account of activities by freelancers was not reported, the carbon footprint of the freelancers' activities is uncertain. The average heating consumption was not estimated solely for the office space; but was an average for the whole building containing cellar storage, restaurants, shops and offices, which usually require lower levels of heating. The data on photography sessions was based on our study of only one photographer's working conditions. Thus, the result of the carbon footprint study will give an indication of the magnitude of greenhouse gas emissions and indicate the major reasons for emissions.