



Environmental impacts and aspects in the forest industry: What kind of picture do corporate environmental reports provide?



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ABSTRACT

Despite its good environmental track record, the Finnish forest industry nonetheless causes harmful environmental impacts. This paper studies corporate environmental reports within the Finnish forest industry to determine the environmental performance of the industry at large. Fifteen years of environmental reports from the three biggest Finnish forest industry companies are analysed. The majority of these reports focus on inputs needed for production (especially energy) and unwanted outputs (especially air and water emissions) in the industry. The environmental impacts in areas of the industry taking place outside of mills, however, are less often reported and appear to be less important to the companies. This paper makes five contributions to the literature: First, the forest industry's reporting, as a less researched field, is studied in detail. Second, the forest industry's environmental reporting is diverse, comprised of multiple indicators and units of measurement. Third, the energy indicator reporting is both established and diversified. The diversity makes the reports as a weak source of comparison of environmental performance. Fourth, the case companies seldom report the environmental performance of their supply chains. Fifth, while the prior literature has analysed multiple environmental impacts of the forest industry, the case companies report on very few of them. The paper concludes by stating that future environmental reporting should especially address supply chains and multiple environmental impacts caused by the industry.

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1. Introduction

1.1. Positioning the research

The forest industry is a heavy industry. It is energy and material intensive and, therefore, causes multiple environmental impacts. The environmental impacts caused differ among the different phases of the forest industry chain: forestry at a minimum affects the landscape and biodiversity (Mielikäinen and Hynynen, 2003), while the production of forest industry products causes, for example, eutrophication and climate change (Silva et al., 2015; Dias et al., 2004; Lopes et al., 2003). The industries' environmental impacts are reviewed in detail in Section 3 based on previous life cycle assessment (LCA) studies.

This research focuses narrowly on the Finnish forest industry. The Finnish forest industry, along with the European forest industry in general, has a good environmental track record. For example, in the Finnish forest industry significant improvements have taken place in terms of CO₂ emission reduction (over 60% from 1990 to 2012) and landfill waste (over 80% during the same period) (Finnish

Forest Industries Federation [FFIF], 2013). However, currently, the forest industry in Europe is facing challenges in finding new businesses to compensate for the low demand for traditional forest industry products such as paper. The environmental performance of the Finnish forest industry is reviewed in detail in Section 5.1.

This study focuses on the environmental performance of the forest industry from the perspective of indicator reporting. Yet another reason to focus on the forest industry is that it is seldom studied from this point of view (Li et al., 2011; Sinclair and Walton, 2003), as will be shown in Section 4. In environmental reports, companies provide both qualitative and quantitative information about their environmental performance (Hammond and Miles, 2004). The quantitative information in particular provides reliable information about how companies are performing. Nevertheless, as Panwar et al. (2014) pointed out when researching the US forest industry, the industry has information gaps as it fails to publicly communicate its level of environmental performance. Indicator reporting is reviewed in Section 2.

1.2. The aim and structure of this paper

The aim of this paper is to study the content of corporate environmental reports (CERs) by the Finnish forest industry. CERs are an

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instrument for outlining the industry's environmental performance. The indicators presented in these reports are used in this study, as they are aimed at highlighting the companies' environmental performance results. Specifically, the CERs of the three major Finnish forest industry companies (Stora Enso, UPM-Kymmene and Metsä Board) from 1998 to 2012 are reviewed. From these, this paper seeks to analyse the environmental performance indicators used by the case companies and to answer the following three research questions:

1. Which environmental aspects and impacts are covered in the environmental reports and how they are reported?
2. Which are the most important of these environmental aspects and impacts to the companies?
3. Which are the least important aspects and impacts to the companies?

The structure of this paper is as follows: Section 2 describes the use of indicators in environmental reports. Section 3 reviews the literature on the environmental impacts of the forest industry mainly based on previous LCA studies. Section 4 reviews prior research involving content analysis of environmental reporting in the forest industry. Section 5 presents the case companies in this study, their environmental reports and the content analysis method used in this study. Answers to the research questions are provided in Section 6. Section 7 discusses and compares this study's results with those of the previous literature and draws conclusions.

2. Indicators in the environmental reports

A corporate environmental report (CER) is a tool of corporate environmental management (Lober et al., 1997). CERs can be used to inform stakeholders about a company's environmental performance (Azzone et al., 1997; Marshall and Brown, 2003). The content of a CER varies among companies but typically it comprises a company's environmental performance regarding the natural environment, environmental protection and resource use (Azzone et al., 1997; Jenkins and Yakovleva, 2006). In addition, companies often disclose their environmental policies, practices and future plans in a CER (Azzone et al., 1997; Adams, 2004). Companies can use quantitative, qualitative and monetary data to provide this information (Hammond and Miles, 2004).

One way to disclose this information is through indicators. The literature offers multiple definitions of indicators. For example, the Organisation for Economic Cooperation and Development (OECD) (1993, 6) defines an indicator as 'a parameter, or a value derived from parameters, which points to/provides information about/describes the state of a phenomenon/environment/area with a significance extending beyond that directly associated with a parameter value'. On the other hand, environmental performance indicators are defined, respectively, in the environmental management system ISO 14000 series and in the Global Reporting Initiative (GRI), a sustainability reporting framework, as something that 'provides information about an organisation's environmental performance' (ISO, 2004a, 2013, 15) or impact (GRI, 2013). 'Environmental performance' is defined in ISO 14001 as the measurable results of environmental management in an organisation (ISO, 2004b).

Companies use indicators internally to assess their environmental performance and find areas for improvement and externally to communicate these actions to stakeholders (Mazzi et al., 2012). When companies also report quantitative results, they are better able to monitor their environmental performance internally and to improve it (Hooper and Greenall, 2005). Jones (2011), who researched the graphs in company reports, further highlights that graphs represent an easy way for readers to access information. In addition, both Daub (2007) and Adams and Frost (2008) stress that the use of indicators in reports provides the most reliable data for a reader. Although many scholars have emphasized the use of

indicators in the reports, others (e.g. Roca and Searcy, 2012; Mazzi et al., 2012; Marshall and Brown, 2003) have pointed out that indicator reporting has not been greatly researched. Indeed, Roca and Searcy (2012) point out that indicator reporting research has been rather superficial.

The most common reporting framework currently used is the GRI (Roca and Searcy, 2012; Brown et al., 2009). GRI guides companies through the process of reporting sustainability information, including environmental (GRI, 2013). The guidelines also include a list of indicators that companies are recommended to report. The application level of the guidelines determines the number of indicators that companies must report (GRI, 2013).

3. The forest industry and the environment

This section shortly describes the forest industry processes and highlights the environmental impacts caused. This is done via a review of selected previous life cycle assessment (LCA) studies. The studies were limited to those that address the subsystems and processes of the forest industry but not related industries. For example, the bioenergy sector is excluded from this review. The studies were collected by browsing relevant journals. The search was not limited to a specific geographical area or time. The main focus was on the *Journal of Cleaner Production* and *International Journal of Life Cycle Assessment*. Additional articles were found from the references in suitable articles.

For the purposes of this study, the forest industry's production chain will be discussed in the following five parts: 1) forest management, 2) pulp and paper production, 3) wood processing, 4) waste management and 5) transportation.¹ Although the processes are analysed separately, they are often connected in practice (as shown in Fig. 1). The wood and wood-based residues (such as bark, dust and chips) produced in various processes of the forest industry can be used as raw materials or energy sources in other processes or sub-sectors (Korhonen, 2001).

Forests and their management are typically the first subsystem of the forest industry supply chain. The processes and the environmental impacts in this phase differ depending on whether the timber originates from a planted forest or from 'natural' forests managed by the forest industry. May et al. (2012) found major differences in terms of required resources between wood produced from plantations and 'native' forests. They noticed that to produce as much wood in native forests compared with plantations, one would need 'five times more land, eleven times more water, twice as much fuel, 50% more lubricant and 30% more steel and rubber (in tyres)'. The processes included in forest management include the production of seedlings, site preparation (such as stump removal), infrastructure establishment (such as building roads), planting, weed control, harvesting (including thinning and final harvesting), ditching, fertilization and transportation (e.g. Dias and Arroja, 2012; Gonzalez-Garcia et al., 2013; May et al., 2012; Seppälä et al., 1998). The main inputs are chemicals (fertilizers, pesticides), energy and water (e.g. Aldentun, 2002; May et al., 2012; Seppälä et al., 1998). Resulting unwanted outputs include air emissions, water emissions and waste (e.g. England et al., 2013; Gonzalez-Garcia et al., 2009b; Gonzalez-Garcia et al., 2009c; Morales et al., 2015). In addition, forest management processes have effects on the landscape and

¹ The author acknowledges that waste management and transportation needs are different in each subsystem (forest management, pulp and paper production and wood processing). In this chapter, these are, however, treated as wholes for the sake of logic. Waste management has not been often addressed in previous LCAs, most probably for the reason that forest industry does not produce that much waste but instead residuals that can be reused or recycled (see Fig. 1). Transportation, on the other hand, is a vital part of the forest industry and has also been variously researched.

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