

1           **“Being one of the boys”**: perspectives from female forest  
2           **industry leaders on gender diversity and the future of Nordic**  
3           **forest-based bioeconomy**

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11           **Abstract**

12  
13           Women working in the Nordic forest sector are underrepresented in top leadership  
14           positions, despite the female share increasing in higher education programs. Little  
15           research exists on this niche actor group in the forest sector context. To fill this gap, we  
16           assess perceptions of female leaders on the state of gender diversity in the Nordic forest  
17           industry, on the future of the forest sector in the bioeconomy, and on the potential  
18           contribution the Nordic forest industry can make to empower women, as promoted by the  
19           UN Sustainable Development Goals. An elite interviewing strategy was used to engage  
20           female leaders working at the top management level of seven Finnish and Swedish forest  
21           companies. According to our results, adapting to “being one of the boys” appears to  
22           persist as a norm for female leaders in this masculine industry field. Participants believed  
23           that their influence on the industry’s sustainability agenda comes from being in a senior  
24           management position, and is not a gender-related aspect. We conclude that the ability of  
25           the Nordic forest industry to adapt to strategic renewal into the bioeconomy will require  
26           a more diverse company culture, which is not solely gender-based and is fostered at all  
27           organizational levels.

28  
29           Keywords: forest sector; bioeconomy; gender diversity; career roles; sustainability

30  
31           **Introduction**

32           An aging workforce, demand for industry renewal, and rising social and environmental  
33           sustainability challenges demand a fundamental transformation of the forest sector. Part

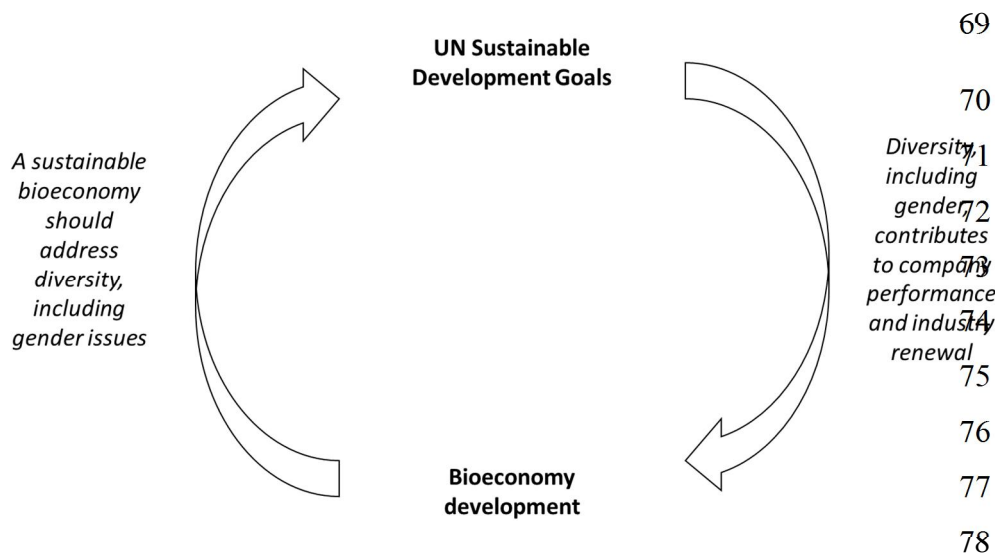
34 of this transformation relates to diversity in company management, including gender  
35 diversity. Women are still underrepresented in the top leadership positions of the Nordic  
36 forest sector, despite high representation in higher education programs (Johansson and  
37 Ringblom 2017). Also, female members represent a 16% share in both the boards of  
38 directors and top management teams in the global top 100 pulp and paper companies  
39 (Hansen et al. 2016). Positive changes in terms of increasing diversity in decision-making  
40 processes have occurred during past decades, but unequal use of power in the sector, or  
41 in society in general, may still compound unnecessary gender stereotypes.

42 Gender inequality and women empowerment is high in the political agenda globally,  
43 being one of the UN Sustainable Development Goals (SDGs) for 2030, (SDG no. 5).  
44 Moreover, gender issues, such as lack of professional identity among women in the forest  
45 sector (Appelstrand and Lidestav 2015), may prevent the most skilled individuals access  
46 to management positions (Holmgren and Arora-Jonsson 2015), thus also hampering the  
47 renewal and transformation of the sector.

48 The existing evidence base related to gendered culture deriving from diversity  
49 management in the forest sector is surprisingly scarce. Lidestav and Sjölander (2007)  
50 analyzed Swedish forestry professionals, and Appelstrand and Lidestav (2015) focused  
51 on female entrepreneurs. In addition, a few forest ownership-focused studies exist (e.g.  
52 Umaerus et al. 2013; Follo et al. 2017), but very limited research has been conducted on  
53 gender aspects in the forest industry. An exception is Hansen et al. (2016), who modeled  
54 the effect of an increased female proportion in the top management level of the global  
55 pulp and paper industry, and found it to have a small but positive effect on company-level  
56 performance. Moreover, the role of workforce diversity and gender issues as a part of the  
57 core business strategy towards a more sustainable forest-based bioeconomy – a dominant  
58 concept in the current political and academic discussion on sustainability – has received  
59 little to no attention (e.g. Li and Toppinen 2011; Hansen 2016).

60 In our study, we explore the perceptions of female leaders working in the Nordic forest  
61 industry regarding the state and forms of existing gendered culture that impact their  
62 careers at the workplace. We inquire about female leaders' perspectives on the future of  
63 the forest sector in the bioeconomy, and about the potential contribution of female  
64 leadership in the decision-making process towards increased sustainability of the Nordic  
65 forest industry, in light of the Global Agenda 2030 goals. This explorative study offers

66 some considerations for untangling the relation between gender diversity, sustainability,  
 67 and the bioeconomy, on the premise that diversity is both an end goal for sustainability  
 68 purposes and a mean to boost the bioeconomy potential (Figure 1).



79 Figure 1. The relationship between gender diversity, sustainability, and bioeconomy  
 80 development.

81  
 82

### 83 **Conceptual background**

#### 84 *Gendered culture and the forest sector*

85 The structural problems related to female representation in labor markets generally  
 86 include a pay gap between men and women in similar positions, and generally lower  
 87 salary levels in female-dominant sectors (Blau and Kahn 2017). The creation of gendered  
 88 practices that eventually set the norms in an organization can be an obstacle for  
 89 institutional change, as people presenting the non-dominant gender may feel their  
 90 competence and authority diminished or questioned.

91 Diversity in top management positions, including gender diversity, tends to have positive  
 92 effects on firm performance (Perrault 2015). The business benefits gained through a  
 93 higher degree of diversity in top management may include improved financial  
 94 performance or strategic benefits such as better compliance with the ethical and social  
 95 standards of a company. This may indirectly raise company value (Isidro et al. 2014) or  
 96 result in higher sustainability ratings (Bear et al. 2010), fostering stakeholders' trust in

97 the company (Perrault 2015). Enhanced corporate reputation and employee attractiveness  
98 (Kakabadse et al. 2015) are other commonly mentioned benefits. The majority of large-  
99 scale companies in the Nordic region tend to incorporate certain gender balancing  
100 elements embedded in their code of conduct or as a part of their sustainability programs.  
101 The gender equality aspect is also covered in the national implementation plans of both  
102 Finland and Sweden for the SDGs of Agenda 2030. Certain forest companies also  
103 explicitly acknowledge gender equality and women's empowerment, but SDG 5 is also  
104 integral to all dimensions of inclusive and sustainable development.

105 Diversity may naturally also have adverse effects on company performance, for example  
106 via increased decision-making costs due to reoccurring conflicts and general friction  
107 between board members (Adams et al. 2015), but overall, the available literature appears  
108 to highlight a greater range of positive than negative outcomes. In addition, further  
109 evidence shows that a minimum threshold may exist in terms of diversity based on  
110 representation of different sexes, as Post et al. (2011) suggest that having as few as three  
111 or more females on a board of directors can positively influence a company's  
112 environmental performance.

113 In reviewing forestry-related diversity management literature focusing on the rate of  
114 female and male representation, Baublyte (2017) identified several barriers that women  
115 may experience in their career paths before reaching top leadership level. These barriers  
116 range from stereotypes and twisted role models to industry culture and social policy -  
117 related aspects. One issue is the tokenism problem, which arises when females are hired  
118 to only improve a company's female-male ratio, to give the impression of better equality  
119 within the workforce. Token females often feel excluded from the rest of the management  
120 group, which concurrently lacks support and respect for the token member. Thus, despite  
121 females potentially possessing strengths to improve corporate sustainability and the  
122 decision-making process, just having token women is not enough (Bear et al., 2010).  
123 Another interesting aspect is the "Queen Bee syndrome", a situation where senior female  
124 leaders who have reached the top, demonstrate their preferences for men instead of  
125 helping other females advance their careers in male-dominant firms and fields (Derks et  
126 al. 2011).

127 Holmgren and Arora-Jonsson (2015) argue that gender equality in the forest sector has  
128 turned into an issue of individuals' opportunities to work and make business, rather than

129 an opportunity to disturb the established and structural power relations in decision-  
130 making. While the most serious gender-related human problems most likely occur outside  
131 the Nordic regions, the Nordics would also benefit from improvements, despite generally  
132 being known as prime examples of gender equality. Johansson et al. (2018) recently  
133 documented the prevailing forms of gendered culture regarding sexual harassment in the  
134 context of the Swedish forest sector, suggesting further research on the actual  
135 mechanisms that allow sexist behavior, both at the workplace and in education.

136

### 137 *Bioeconomy and sustainability*

138 The bioeconomy is among the currently dominant concepts for informing and shaping  
139 pathways for global sustainability transformations (D'Amato et al., 2017). It proposes to  
140 substitute current fossil-based industrial inputs (materials, chemicals, energy) with  
141 renewable biological resources (Kleinschmit et al. 2014; Pfau et al. 2014; Bugge et al.  
142 2016), as Table 1 illustrates. Knowledge and biotechnology -based innovations are key  
143 elements, especially regarding shifts from lower value products/services (e.g. bioenergy,  
144 fiber) to higher value ones (e.g. bio-based materials, chemicals, and pharmaceuticals).

145 The forest sector has a central role in the bioeconomy as both a provider of biomass, and  
146 as a manufacturer of higher-value products (Kleinschmit et al. 2014; Roos and Stendahl  
147 2015). In fact, despite the bioeconomy appearing to be an emerging concept in the context  
148 of corporate sustainability across various sectors, companies in the forest sector are  
149 actively adopting it for communicating sustainability issues (D'Amato et al. 2019).

150 According to Korhonen et al. (2018), the realization of bioeconomy ambitions hinges to  
151 a great extent on the competitiveness of bio-based firms and industries, and their ability  
152 to combine a more diverse knowledge base. The bioeconomy is thus supposed to  
153 contribute to and benefit from the development of regional, multi-actor clusters of  
154 competences, knowledge, and technologies (Bugge et al. 2016). This is to be supported  
155 by, among other industry transformations, a sufficient level of diversity in company  
156 leadership and workforce (Wolfslehner et al. 2016), including ethnic, professional, age,  
157 sex and gender -related aspects.

158

159

160

161 Table 1. Summary of the main visions of the bioeconomy for sustainability.

<b>Sustainability dimension</b>	<b>Main vision of the bioeconomy</b>
Economic	New bio-based or hybrid products and services, advancements in production and innovation with biotechnology; sectoral renewal and inter-sectoral collaboration (Hansen 2016; Reim et al. 2018).
Social	Primary producer livelihoods in rural areas (forestry, agriculture, fisheries); consumer or user-oriented products and services; regional, multi-actor clusters of competences, knowledge, and technologies (Bugge et al. 2016; Pelli et al. 2017).
Environmental	Substituting fossil resources with bio-based ones, possibly following principles relating to sustainable sourcing, cascading use of biomass, and recycling.

162

163 Several scholars and experts have pointed out the current limits of the bioeconomy as a  
164 concept for forwarding environmental and social sustainability (El-Chichakli et al. 2016;  
165 Kröger & Raitio 2017; Pfau et al. 2014) (Table 1). For example, sustainable sourcing of  
166 biomass and efficient resource use, including recycling and reuse, are not explicitly  
167 addressed in the mainstream understanding of the bioeconomy. Scholars have thus  
168 advocated a more inclusive conceptualization of the bioeconomy, which could draw from  
169 related sustainability concepts (e.g. circular and green economy) (Bennich and Belyazid  
170 2017; D’Amato et al. 2017, 2018; Hetemäki 2017). Mustalahti (2018) pointed out that  
171 the forest sector and bioeconomy emphasize the role of industrial sectors in Finland, while  
172 more discussion is needed on human rights, consumer behavior, and citizen participation.

173

#### 174 **Data and methods**

175 Our initial company population was selected from a study by Hansen et al. (2016),  
176 analyzing the state of female representation in the top 100 global pulp and paper  
177 industries, which lists five Swedish companies (Holmen, Setra Group, Södra, Sveaskog,

178 Svenska Cellulosa) and three Finnish forestry companies (Ahlstrom, Stora Enso, UPM-  
179 Kymmene). During the research process, Ahlstrom underwent an organizational change  
180 and became a Swedish-based company Ahlstrom-Munksjö.

181

182 We used an elite interviewing strategy (cf. Berry 2002) to engage women working in top  
183 management. As the women represent a minority at the management level, we assume  
184 their views are particularly helpful for identifying traits of gendered culture in the field.  
185 The interview invitations were first emailed to the intended participants. If a response was  
186 not received, the selected individuals were contacted multiple times via phone or email  
187 during a seven-month period in 2017.

188

189 Among the identified total sample of 32 female leaders in top management teams or in  
190 leadership roles of business lines, 10 were available for interviewing in person or over  
191 the phone, 14 declined the request, and eight could not be reached. Respondents belonged  
192 to seven different forest companies, and their professional roles varied from division  
193 leadership to human resources and legal affairs (see Table 2). Drawing conclusions on  
194 non-respondent bias is not possible using qualitative data, but we can note that female  
195 leaders responsible for corporate communications declined more often than others when  
196 comparing the set of non-respondents. This may relate to communication vice presidents  
197 with non-forestry backgrounds feeling that they have no direct stake in discussing gender  
198 diversity issues in the forest industry.

199

200 Table 2. Interviewees' area of responsibility, country of employment, and duration of the  
201 interview.

<b>id</b>	<b>Area of responsibility</b>	<b>Country</b>	<b>Interview duration (min)</b>
1	Business division	Finland	45
2	Sustainability management	Finland	40
3	Human Resources	Finland	25
4	Human Resources	Sweden	15
5	Business division	Sweden	20
6	Legal affairs	Sweden	20
7	Business division	Sweden	15
8	Business division	Sweden	20
9	Finance	Sweden	25
10	Business development	Sweden	15

202

203 Before the interviews, the interviewer researched each company to analyze gender  
204 diversity in the top management, diversity programs, and company primary business  
205 focus. The interviews and interview style were adjusted to match the interviewees. This  
206 allowed for better understanding of the ideas expressed by the interviewees, enabling  
207 better probing techniques, if necessary. Multiple sources were used to validate the  
208 interviews, which helped minimize the problem of exaggeration and the possibility of  
209 misunderstanding concepts (Berry 2002). Ensuring confidentiality of the interviewees'  
210 identities allowed for more reliable and open communication between the interviewer and  
211 interviewees.

212

213 The interviews were conducted during April–November 2017 in English, and they lasted  
214 an average of 25 min. The interviews were recorded with permission from the  
215 participants, and the data were then transcribed and coded. Thematization was used as a  
216 research method for coding the collected interview data. Firstly, we explored each  
217 interviewee's perceptions concerning the state of gender roles and culture in the industry  
218 and in their company strategic planning. Secondly, we focused on the future of the  
219 industry, and aimed to investigate the potential of forest sector contribution to a more  
220 sustainable bio-based economy.

221

222 Despite the above-mentioned precautions implemented to guarantee successful data  
223 collection (we followed methods used in similar studies or recommended by relevant  
224 literature, e.g. Gummesson 1991; D'Amato et al. 2016), remaining limitations to our data  
225 include the following. First, internal validity of the data is dependent on the interviewees'  
226 experiences and knowledge of the study participants. As a positive side, many of our  
227 interviewed leaders had worked in the industry for many years, even several decades, and  
228 had experienced somewhat similar career paths. However, certain participants had only  
229 spent a few years working in the forest industry. Second, keeping in mind the sensitivity  
230 of the topic from a highly personal perspective, it is possible that certain interviewees  
231 were not entirely open about their experiences and insights despite their full  
232 confidentiality being assured. Third, due to the small number of study participants, a  
233 comparison between the two countries or across professional responsibilities is not  
234 possible, and the observed differences may still be based more on differences between



235 companies rather than individuals or their home countries. Fourth, with such a small  
236 sample, it is impossible to tell how certain enablers could affect the career paths of *other*  
237 *women* in the same industry. Finally, it is impossible to know how the interviewees'  
238 careers would have differed if certain personal-level enablers or barriers had not occurred  
239 during the interviewees' way to top management.

240

## 241 **Results**

### 242 *Gendered culture in the top management of the Nordic forest industry*

243 The gendered culture was perceived to prevent females from having equal opportunities  
244 for reaching leadership positions. According to the interviewees, women in the Nordic  
245 forest industry are expected to adjust their professional image and behavior to match the  
246 standards set by male colleagues, which is likely to hinder institutional change toward  
247 true gender equality (Arora and Jonsson 2015; Appelstrand and Lidestav 2015). Adapting  
248 to "being one of the boys" appears to persist as a norm for female leaders, as illustrated  
249 by the following quote:

250 *"I think I have not made it [gender] an issue. In that sense, I guess being one of*  
251 *the boys but yet a female. So I think what has helped me, I think are my*  
252 *leadership skills, I think I'm good with people, good with customers, but also*  
253 *good with [my] own people."*

254

255 The inability to participate in certain social practices, such as sauna or hunting, did  
256 emerge in several interviews as an important challenge for female career development.  
257 Exclusion from social practices implies missed opportunities for social bonding,  
258 networking, and information sharing; more importantly, it means not being able to fully  
259 participate in informal decision-making processes. In the context of sauna, one  
260 interviewee expressed her position as:

261 *"They made it quite clear that if I wanted to, I could use the sauna first and then*  
262 *they would go in after me. They would go to a social event, and I would be*  
263 *sitting there alone."*

264

265 The observations that female leaders "age faster" than their male colleagues can be  
266 considered sexist, as one interviewee stated: "A 50-year-old lady is older than a 50-year-

267 *old man.*” The perceived difference in aging is a yet unidentified form of gendered culture  
268 in the forest sector (see Johansson et al. 2018). Someone identified the lack of technical  
269 forestry education background to act as an entry barrier into the field and career  
270 development, as the following quote demonstrates: “...*At least in Sweden, you tend to*  
271 *hire from a very narrow scope of people...*”, which establishes cultural conformity  
272 exclusive of “outsiders” that might be competent but not sharing the same educational  
273 identity.

274

275 A few interviewees also saw being female as an advantage in certain circumstances, for  
276 example by being remembered better among the male-dominated peer group. Three  
277 participants believed that the beginning of their careers and their climb on the career  
278 ladder had been the most difficult time during their careers due to old beliefs and a highly  
279 masculine industry culture, whereas others said that gender-related challenges can  
280 actually become worse with aging and increasing career ambitions. The following two  
281 quotes illustrate the range of this continuum with respect to being a woman in a male-  
282 dominant sector:

283 *“You have to endure the first 15 years. But once you get to a senior position, I do*  
284 *not think it is so much of a problem.”*

285 *“I think it [the greatest challenge] is age and competition. If you’re past 40, then*  
286 *I think you begin competing with the guys. And then you start having problems.”*

287

288 Differences were recorded among the interviewees regarding experienced difficulties  
289 during their personal career paths. Moreover, the diverse personalities of the interviewed  
290 leaders also became visible when reflecting on their personal experiences. Only one  
291 leader claimed to have noticed the “Queen Bee phenomenon” (Derks et al. 2011). The  
292 woman described the relationships among men to be very brotherly, while women often  
293 did not appear to share a similar sisterhood relationship with their female colleagues,  
294 which may indicate the need to adapt to the gendered culture. Nonetheless, many  
295 respondents highlighted the importance of building a diverse set of competencies and  
296 receiving support from their superiors as powerful enablers for their career paths. The  
297 most important point was to have someone “...*who believes in you...*”, irrespective of  
298 whether it is a male or a female.

299

300 A more detailed summary of the enablers and challenges regarding career development  
 301 based on our sample are summarized in Table 3. It should be noted that these factors do  
 302 not appear in order of any importance ranking. Based on Table 3, several features of  
 303 gendered culture exist in the Nordic forest industry, which in the context of this study  
 304 represent challenges for females moving toward leadership positions. These may be  
 305 generalized for diverse gender identities beyond biological sex. In parallel, several  
 306 enabling factors that positively promote higher gender equality at the top can also be  
 307 identified.

308

309 Table 3. Observed challenges and enabling factors of female leaders in the Nordic forest  
 310 industry (modified from Baublyte 2017)

311

<b>Observed challenges:</b>	<b>Characteristics enabling reaching leadership positions</b>
<ul style="list-style-type: none"> <li>· Existence of masculine networks and homosocial reproduction</li> <li>· Not being able to participate in certain social events due to gender</li> <li>· Abandonment of own gender identity to avoid being discriminated and stereotyped</li> <li>· Inconsistency between characteristics attributed to leaders and those attributed to women in general</li> <li>· A lack of technical forestry education background</li> <li>· Social norms regarding childcare arrangement</li> </ul>	<ul style="list-style-type: none"> <li>· Females aiming for high competence levels: continuous skill development and use of cross-functional training, development of leadership skills</li> <li>· Females with devotion to tasks, determination, and awareness of personal goals and ambitions, and with readiness to step out of individual comfort zones and to take chances</li> <li>· Existing personal-level support systems</li> <li>· Having a boss supportive of career development who pushes the employee to reach higher</li> <li>· Role models exist as an essential aspect of motivating young females, as well as modernizing the image of the entire industry</li> </ul>

312

313 ***Corporate sustainability and the future of the forest industry in the bioeconomy***

314

315 The perceived gender-related challenges in leadership positions discussed above also  
 316 provide further insights into strategic business development. The interviewees are not

317 able to separate their professional and seniority level from their gender, while overall they  
318 felt their voices were being heard in the corporate decision-making regarding  
319 sustainability issues. They feel they hold sufficient authority and that as leaders they are  
320 respected, and their opinions are taken into account. One interviewee underlined that  
321 social and environmental sustainability has high personal value, as the following quote  
322 elaborates:

323 *“I am in a position where I have influence. And I personally think that*  
324 *sustainability is very important. And I am very much involved in such issues. So I*  
325 *do not think that it is me being a woman, but rather me being in a senior position*  
326 *with an interest in social sustainability issues.”*

327

328 The global role of forest-based bioeconomy in creating a more sustainable future was  
329 recognized by all study participants. This was fairly often voiced from a pragmatic  
330 perspective regarding the types of products the pulp and paper industry may develop in  
331 the future, which may, in part, support more sustainable natural resource-based  
332 production and consumption. Replacing plastic and fossil fuels with renewable materials  
333 was the most quoted example, and the following quote expresses optimism toward the  
334 industry’s capability of renewing itself:

335 *“I think there are going to be a lot of new products, to replace plastic for*  
336 *example, also a lot of [development] thinking around the production, what else*  
337 *could be done. We already resemble a circular economy with an integrated pulp*  
338 *mill, and now the question is how to use the side products in a better way.”*

339

340 One female leader separated bioeconomy into three production lines: traditional (pulp  
341 and paper -based), innovative new products, and the increased reuse of waste and industry  
342 side streams. Even though she believed that pulp and paper production is going to be  
343 important in the future, she stated that the bioeconomy should focus more on developing  
344 new innovations. The third part of the forest bioeconomy, focusing on circularity, may  
345 also be crucial for the future of the sector. According to an interviewee, if these parts of  
346 the bioeconomy can operate in balance with sustainable forest management, the industry  
347 can provide many better solutions for the future of the world. Nonetheless, she concluded  
348 with a cautionary note:

349           *“I think that old-fashioned ‘technology guys’ are coming too much to the front*  
350           *and are intensifying too much too quickly. We need to really consider now how*  
351           *much wood we can really use for our bioeconomy.”*

352

353   One interviewee also pointed out that the number of female forest owners is increasing in  
354   Finland, as it is in Sweden, which is likely to diversify forest industry firms’ roundwood  
355   procurement seller-buyer relationships. The diversifying forest ownership structure may  
356   also increase demand for non-wood forest products and forest protection services. A more  
357   diverse workforce in companies operating both locally and globally would allow leading  
358   companies to tap into a broader pool of resources, and to also encourage more intense  
359   inter-sector communication, as the following quote illustrates:

360           *“I think, in general, that broader diversity in any kind of dimension has a positive*  
361           *influence. Because you have people with different perspectives, different*  
362           *backgrounds, seeing things in different ways, and that creates [new] dynamics in*  
363           *the industry as such. ... Especially, if you want to look into the future and develop,*  
364           *you need to incorporate different views, otherwise you will be caught up in old-*  
365           *fashioned ways.”*

366

367   One interviewee said that forestry could contribute to nearly every SDG set by the UN.  
368   Even though the possibilities are endless, companies are practically forced to focus on a  
369   few key goals. Replacing fossil fuels and materials, and further developing sustainable  
370   forest management solutions were mentioned as crucial avenues towards sustainability.  
371   Interviewees also mentioned that reaching the SDGs will inevitably require cooperation  
372   between various sectors:

373           *“I think we should look at it as a partnership between various*  
374           *companies, various fields, sectors. This is not a one-man show.”*

375   Lastly, having high corporate standards for social sustainability can be an essential aspect  
376   of a more sustainable future, as also envisaged in the emphasis area crossing between  
377   SDG 5 and SDG 9.

378

379

380 **Discussion**

381 Our qualitative findings illustrate manifold practical hindrances in what it means to be  
382 working as a female top-level leader in the traditional and masculine forest industry,  
383 where women are still underrepresented at the management level. The interview results  
384 show that the Nordic forest industry is still considered a traditional and masculine field  
385 of business, as also noted in previous literature (Lidestav and Sjölander 2007; Vainio and  
386 Paloniemi 2013). However, the ability of the interviewed female leaders to succeed in  
387 their careers despite gendered culture-related barriers demonstrates that the forest sector  
388 is moving ahead towards higher gender diversity. Despite this indication, it must be  
389 remembered that this is a highly exclusive and extremely small group of female leaders,  
390 as we identified a total of 32 women in top management teams or equivalent leadership  
391 roles of business lines.

392

393 With the limited amount of evidence gathered through our interviews with 10 managers,  
394 we cannot formulate definitive conclusions on the state of gender-related challenges in  
395 the Nordic forest sector. It is also not possible to depict the state of reported phenomena  
396 beyond the sample, such as the need to mimic the behavior of male peers (Hoyt and  
397 Murphy 2016) or even the lack of empathy for female peers (Derks et al. 2011).  
398 Moreover, certain issues may be so painful that the interviewees did not consider even  
399 the anonymous interview situations confidential enough to bring them to light, thus  
400 fostering conformity with a culture of silence needed for “climbing the ladder” in the  
401 industry (Johansson et al. 2018). For example, tokenism, the practice of hiring women  
402 merely to improve a company’s gender ratio did not emerge from the interviews, even  
403 though it appears relevant in previous literature on gender diversity (Bear et al. 2010).  
404 Notably, while the interviewed women on the one hand acknowledge the role of gender  
405 diversity in transforming the industry, on the other hand they identify such transformation  
406 as still conforming to masculine norms. Holmgren and Arora-Jonsson (2015) observed a  
407 similar phenomenon in the context of Swedish forest policy, where the explicitly  
408 articulated aim is to change women from being “inactive” and “underrepresented” rather  
409 than changing the underlying structures, which make them marginalized in the forest  
410 sector. According to them, the dominance of economic values (competitiveness,  
411 economic growth, individualism, faith in markets) over sustainability and responsibility

412 instill the renewal of the forest sector toward improved climate mitigation practices and  
413 gender equality (Holmgren and Arora-Jonsson 2015).

414

415 The results from our study have concurrently built a positive picture of the active  
416 recognition of sustainability issues at the top leadership level. This impacts the Nordic  
417 forest industry by increasing the awareness level concerning the importance of corporate  
418 sustainability and the importance of the question of how the forest industry could  
419 potentially contribute to solving global sustainability challenges. The interviewed female  
420 leaders unanimously stated that their influence on industry sustainability agenda comes  
421 from being in a senior position. This warrants studying the same topics among a  
422 comparable sample of male leaders, to assess whether gender-specific influences to  
423 sustainability orientation can be established or not. In general, we have very limited  
424 understanding concerning the role of the actual people driving the change to the  
425 bioeconomy (Hansen et al. 2016). We have limited understanding of the knowledge and  
426 power structures these people create, and how these structures are related to gender or  
427 diversity.

428

429 Nonetheless, the ability of Nordic forest companies to adapt to future needs will obviously  
430 require more diverse company culture, which is not solely gender based and is fostered  
431 at all organizational levels. Replacing fossil fuels, plastic, metal, and cotton with  
432 renewable bio-based materials will require the intensified use of forest resources, but the  
433 challenge is accomplishing this without compromising sustainability in resource use.  
434 Enhancing circular economy aspects, suggested by one of the interviewees, could provide  
435 solutions to this (Ciccarese et al. 2014; Bezama 2016; Vis et al. 2016). The respondents  
436 in our study also remarked that the future of the forest sector relies on a shift from  
437 traditional (pulp and paper) to more innovative products.

438

439 As also emphasized by Kleinschmit et al. (2014), the bioeconomy concept has developed  
440 to include a great variety of agendas and ambitions, implying that challenges and  
441 opportunities may cause the borders of the traditional forest sector to become blurred.  
442 The next significant goal for forest companies appears to be modernizing the industry's  
443 image. An aging workforce and inability to attract young talent create a barrier for further  
444 industrial development. Playing an important role in a sustainable future, the forestry

445 industry must rethink its old concepts and become a part of the modern and urbanized  
446 world. Focusing on the bioeconomy and innovativeness of future solutions, the sector can  
447 (and should) interest and attract young talents (Hodge et al. 2017; Lawrence et al. 2017).

448

#### 449 **Conclusions and future research**

450

451 Our exploratory study investigated perceptions of female leaders in the Nordic forest  
452 industry on gendered culture in the workplace, and on their role in the strategic decision-  
453 making process toward corporate sustainability and the future of forest industry in the  
454 bioeconomy. The Nordic forest industry still appears to be a traditional and masculine  
455 field of business. A more diverse company culture at all organizational levels, not just  
456 gender based, has been called for to foster the ability of the Nordic forest industry to adapt  
457 to strategic renewal into the bioeconomy. Higher diversity at the top management level  
458 represents one under-recognized opportunity, which may allow the industry to grow and  
459 evolve into an even more important player globally, to better meet diverse customer  
460 expectations, and to earn the social license to operate both at local and global levels.  
461 However, having no active diversity management policy can create challenges in the  
462 work climate and job satisfaction (see e.g. Vinnicombe and Singht 2002; Aalto et al.  
463 2014).

464

465 Many areas still require investigation from a gender-specific research perspective. Due to  
466 the small number of potential respondents in the context of the Nordic forest sector,  
467 pursuing face-to-face and longer interviews may be worthwhile. Broader samples could  
468 otherwise extend to women working in middle management or in small- and medium-  
469 scale forest companies, as well as the top management level in expert roles. This could  
470 bring new and more comprehensive insights concerning the role of women empowerment  
471 as a way of increasing the inclusiveness and social sustainability of Nordic societies.

472

473 Collecting paired reference data on male leaders from a similar management level would  
474 also be of interest, to reach a more comprehensive and comparative assessment on top  
475 management perspectives concerning the commitment to sustainability and other core  
476 issues – such as the bioeconomy – around industry renewal opportunities and challenges.

477



478 Expanding the analyses to other areas beyond the Nordic countries would be useful in  
479 discerning between culture-specific and more universal aspects. Comparative  
480 assessments can also be performed with other masculine industries, such as metal industry  
481 or engineering and consulting, which have undergone changes in gender diversity. This  
482 would allow the forest industry to learn from best practices implemented elsewhere.

483

484 At the practical level, a scope to eliminate discriminations and stereotypes still appears to  
485 exist, and company-level gender diversity and awareness programs should be developed  
486 further to reach this outcome. Educating employees about the challenges of under-  
487 represented employee groups and the underlying causes of these issues could improve the  
488 general awareness in the subject matter (Johansson et al. 2018). Having more clear and  
489 concrete diversity goals at different levels of the company, rather than one for leadership  
490 teams and one for more general purposes, could allow companies in the Nordic forest  
491 industry to identify problem areas and focus on solving the most critical ones.

492

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497

498

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647

648 Appendix 1. Interview questions

#### 649 GENDER & FOREST INDUSTRY

650 1. How would you describe the general atmosphere within your company with respect  
651 to females in the workforce? (Has this changed during your time at the company?)

652 2. How would you describe the general atmosphere within the industry with respect to  
653 females in the workplace? (Has this changed during your career?)

#### 654 CAREER PATH

655 3. What do you think were the main three factors that helped you attain a leader's  
656 position in this field?

657 4. What do you consider to be the three largest obstacles to overcome to advance to this  
658 position?

659 5. What do you currently see as the most challenging issue in being a female leader in  
660 the forestry sector?

#### 661 IMPACT

- 662 6. How do you think your presence as a female leader impacts the financial,  
663 environmental, and social performance of your company?
- 664 7. As a female leader, do you think you can influence the strategic planning/decision-  
665 making process in relation to corporate sustainability? In what way?
- 666 8. From your perspective, what do you see as the primary benefits to a forest sector  
667 company in having females in top leadership?
- 668 FUTURE
- 669 9. What would make the sector a more attractive place to work for female leaders?
- 670 10. What advice would you give to young females entering the industry?
- 671 11. In your opinion, how can the forest sector contribute to the Sustainable  
672 Development Goals (timeframe: towards 2030)?
- 673 12. What is the future of the forest sector in the bioeconomy (towards 2030)? Please  
674 describe in 2–3 sentences.