

Article

Norwegian Firms' Green and New Industry Strategies: A Dual Challenge

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Abstract: Today, there is strong pressure for firms, in Norway and abroad, to adopt green or sustainable strategies. Furthermore, many Norwegian firms, directly or indirectly dependent on the dominating but declining petroleum sector, face a further challenge as they have to enter new industries in search of market opportunities. We address these dual challenges and study how green and new industry strategies are a function of firm- and regional-level characteristics. Multilevel analyses of Norwegian survey data show that both green and new industry strategies are pursued by knowledge-intensive firms that are innovative and having interfirm innovation collaboration. Green strategies are pursued by large firms and firms localized in sparsely populated regions, but they are avoided by independent firms and firms having carried out layoffs. New industry strategies are pursued by small firms, firms with growth in employees, and firms having carried out mergers or acquisitions and cost reductions.

Keywords: green strategies; new industry strategies; green innovation; eco-innovation; sustainability

1. Introduction

Today, there is strong pressure for firms, in Norway and abroad, to adopt green or sustainable strategies. Furthermore, many Norwegian firms, directly or indirectly dependent on the dominating but declining oil and gas industry, face a further challenge as they have to enter new industries or businesses in search of market opportunities. In this study, we address these dual challenges, and in particular, we investigate firm-level and regional characteristics that enable or disable firms to adopt green or new industry strategies.

A green strategy implies a proclivity to collaborate with stakeholders concerning environmental improvements, share information with competitors concerning environmental improvements, emphasize environmental improvements rather than short-term economic gains, and emphasize environmental improvements as a means of increasing earnings. The concept is grounded in green- or eco-innovation research [1–3]; however, for this study, we developed items applicable to also include firms that are not explicitly innovative, and to study firms operating in a diverse set of industries beyond the manufacturing sector.

The concept of new industry strategy is similar in connotation to cross-industry innovation capability. In a recent study, Hauge et al. defined it as “the ability to adapt existing products, processes and systems into new industries” [4] (p. 390). The concept implies that a firm transfers resources and capabilities from the industry where it currently operates to another new industry [5]. Empirically, we study the concept by asking firms to indicate whether they have increased sales in an industry where they previously had limited sales or whether they have entered an industry that is totally new to them.

Our study contributes to the research literature as follows. Firstly, we study firms' green strategies, independent of whether they are developing genuinely new and innovative products or manufacturing processes or not. There is an increasing amount of studies investigating green- or eco-innovations, but in our opinion, they do not take into account the vast amount of firms that are not explicitly innovative, according to a conventional understanding of the concept (for an overview of the literature of eco- and green innovations and definitions of the concept, please see [3]). Secondly, we aim to study firms' green strategies across numerous industries. Previous research has, for instance, investigated a limited range of manufacturing industries (e.g., [1,2]); however in our study, we have aimed to develop indicators applicable to measure green strategies that also include firms operating in service sectors. Thirdly, few studies have examined firms' new industry strategies [4], and to our knowledge, previous research has not studied the concept by analyzing a dataset covering numerous industries. Fourthly, and as noted, we aim to understand better factors that explain how firms approach the dual challenges of adopting green strategies along with their proclivity to enter new industries. Gaining such knowledge can better equip managers and policymakers to tailor their efforts in the pursuit of both enabling firms to adopt green and new industry strategies, we argue. In addition, we believe that the study's findings are of importance for other national contexts where firms are dependent on one or a few large, but dominating, industry sectors.

The firm characteristics we study are whether firms are innovative, i.e., developing new or improved products, services, or manufacturing processes, or whether they have interfirm innovation collaboration with other organizations. These variables are good proxy measures of firms' knowledge intensity, we will argue in this study. In addition, we study firm size in number of employees, firm age, whether the firm is independent or part of a larger corporation, whether it has carried out layoffs or whether it has had growth in employees recently, whether it has carried out a mergers or acquisitions, or whether it has carried out cost reductions. All in all, we argue that these constructs give vital information about crucial firm characteristics as potential carriers of green and new industry strategies, and we elaborate them in greater detail below. Finally, we study whether localization in densely vs. sparsely populated regions affects firms' proclivity to pursue green or new industry strategies. Research from Norway indicates that localization in sparsely populated regions strengthens firms' local embeddedness and social responsibility [6]. Research, moreover, indicates that localization in sparsely populated regions increases firms' product innovation performance [7], but we do not know whether the regional context also influences green or new industry strategies.

To study our research question, we carry out multilevel analyses at the firm and regional levels. "While most social science studies normally focus on one particular level of analysis, for example, enterprise level or regional level, respectively, multilevel studies, on the other hand, empower the ability to assess how lower-level units respond, behave, or act as a function of the context, that is, characteristics of higher-level units, in which they are embedded" [8] (p. 780). Empirically, we analyze a Norwegian dataset of 1160 firms that are located in 80 (of a total of 89) economic regions in the country and that operate in many different industries.

1.1. Innovation and Interfirm Innovation Collaboration

Innovative firms and firms with interfirm innovation collaboration are relatively knowledge intensive, we argue. Our argument is grounded in research showing that such firms predominantly have an analytical knowledge base [9], which is dominated by codified competence and scientific skills [10–12]. An analytical knowledge base, in turn, is a proxy for firms' absorptive capacity "to recognize the value of new, external information, assimilate it, and apply it to commercial ends" [13] (p. 128). Absorptive capacity enables "the acquisition of novel and valuable knowledge from external networks" [14] (p. 157) and "helps in learning external sources of knowledge" [15] (p. 333). As such, we argue that knowledge-intensive firms, due to their absorptive capacity, will relatively easily perceive potential benefits of pursuing green and new industry strategies as viable responses to challenges related to environmental sustainability and market constraints.

In a similar vein, it is not unlikely to assume that knowledge-intensive firms have the necessary dynamic capabilities to handle the dual challenges of green and new industry strategies (for further readings on dynamic capabilities, see [16–22]). Taken together, we assume that innovative firms and firms with interfirm innovation collaboration will tend to adopt green and new industry strategies.

1.2. Firm Size

Large firms have, with everything else being equal, more market power than small firms that can be channeled toward the development of green strategies. Size also makes it possible to specialize parts of the workforce toward the development of green strategies, and large firms' economies of scale further increase the possibilities to develop more environmentally friendly waste management. Large firms are also more exposed to the general public, e.g., to various interest groups, which can also influence or even force them to focus on green strategies. In light of this argument, a study of the Spanish hotel industry found that enterprise size correlates with a focus on green and innovative strategies [23]. Other studies point in a similar direction [24,25]. We, therefore, find it reasonable to assume that large firms to a greater extent than small firms adopt green strategies.

Concerning new industry strategies, on the other hand, we assume that firm size has an opposite negative effect. The reason is that large firms potentially have fewer incentives to enter new industries due to market power and productivity gains in their current market [7,26]. Size in itself, moreover, makes it more challenging to make a strategic shift into a new industry. A Portuguese study found, in line with our reasoning, that large firms coped worse than small firms during economic downturns [27]. Taken together, we assume that size has a positive effect on firms' green strategies and a negative effect on firms' new industry strategies.

1.3. Firm Age

Balasubramanian and Lee report that "firm age is negatively related to technical quality", and particularly "in technologically active areas" [28] (p. 1019). In line with their findings, we assume that aging firms also downplay, or face challenges, concerning green and new industry strategies as their learning and experience become outdated [29,30]. To implement green and new industry strategies, firms can benefit from their absorptive capacity, we have argued, but as firms age, it appears that this ability dwindles (cf. *ibid.*). Taken together, we conclude that firm age has a negative effect on firms' green and new industry strategies.

1.4. Independent Firm

An independent firm implies that it is not owned or controlled by a mother company. We find it reasonable to assume that an independent firm to a lesser degree than a firm owned or controlled by a mother company will adopt a green strategy. The reason is that an independent firm will have less access to professional resources enabling it to do so. Aarstad et al. [9] showed that for enterprises without R&D, being part of a multidivisional corporation resulted in a relatively high probability of generating product innovations. Even though they did not study eco-innovations or green strategies, in particular, we believe that their findings indicate that firms being owned or controlled by a mother company can provide daughter firms resources to implement novel ideas, which appeared to substitute for R&D investments in their study. Moreover, an independent firm will not experience pressure from a mother company to adapt their strategies in a green direction. We, therefore, conclude that being an independent firm has a negative effect on the adoption of green strategies. Concerning new industry strategy, we are unsure about a potential effect from being an independent firm, but we include the parameter for explorative reasons and as a control variable.

1.5. Carried out Layoffs

Firms having carried out layoffs can imply that they experience challenges. As a consequence, they may chiefly focus on daily operations and downplay a focus on green strategies, which potentially

have a more long-term focus. In line with this argument, a study from Italy showed that financially robust firms invest more in green innovations than otherwise [31].

Having carried out layoffs can also imply that firms experience challenges in terms of reduced sales and revenues in their current market, which may induce them to adopt a new industry strategy. In other words, if a firm has to reduce the work stock due to challenges in its current market, carrying out layoffs may actually act as an indicator for firms to adopt a new industry strategy in search for market opportunities. We, therefore, conclude that having carried out layoffs will have a negative effect on the adoption of green strategies, and positive effect on the adoption of a new industry.

1.6. Growth in Employees and Mergers and Acquisitions

Firms having had growth in employees or having carried out mergers and acquisitions is an indicator of a robust financial and organizational position, we argue. As such, they are indicators of firms that do not need to focus on day-to-day operations merely but instead have the organizational and management slack to focus beyond their immediate needs. We, therefore, conclude that such firms, to a relatively strong extent, will adopt green strategies. Moreover, we assume that they are also likely to adopt new industry strategies as growth in employees can indicate that a firm is growing by entering a new industry. In a similar vein, we assume that a merger or acquisition can reflect that a firm applies such an approach to implement a new industry strategy.

1.7. Carried out Cost Reductions

Firms having carried out cost reductions can be an indicator of a weak financial and organizational position, we argue. As such, it may be an indicator of firms in need of focusing on day-to-day operations and not having the organizational and management slack to focus beyond their immediate needs. We, therefore, conclude that such firms, to a relatively limited extent, will adopt green strategies. In a similar vein, it is not unlikely to assume that firms having carried out cost reductions lack the necessary resources to adopt new industry strategies. On the other hand, it is not farfetched to assume that carrying out cost reductions may actually push a struggling firm to search for new market opportunities in an industry that is different from where it currently operates.

1.8. Regional Population Density

Research from Norway indicates that localization in sparsely populated regions strengthens firms' local embeddedness and social responsibility [6]. This may impart environmental concern among firms located there, and geographical proximity to natural resources may further induce an incentive to pursue green strategies. As sparsely populated regions are relatively transparent, firms located there may also feel a push toward adopting green strategies. Research, moreover, indicates that localization in sparsely populated regions increases firms' product innovation performance [7]. The authors behind the research argue that some sparsely populated regions have a long heritage of innovative solutions. An alternative explanation is that "the innovative potential increases in regions where the population density is low because people are relatively knowledgeable about complementary competencies that exist in the geographical area" (p. 853). We, therefore, conclude that firms in sparsely populated regions pursue green strategies, due to local embeddedness, social responsibility, and proximity to natural resources, along with sparsely populated regions' heritage of innovative solutions and knowledge about complementary resources. Concerning new industry strategy, we are unsure about a potential effect from regional population density, but we include the parameter for explorative reasons and as a control variable.

2. Materials and Methods

2.1. Empirical Context

To study our research question, we analyzed data from a national survey that was carried out by telephone interviews with chief executive officers (CEOs) during the first months of 2018. The telephone interviews and the coding of the raw data were carried out by Ipsos, a professional market research and consulting firm. Eight hundred firms in the counties of Rogaland, Hordaland, and Sogn og Fjordane, and 401 firms in the rest of the country were surveyed. Firms having at least five employees and operating in most industries, except for the real estate and the public sector, were targeted for the survey. The response rate of the survey was 34.8% among firms with whom the interviewers obtained contact. The response rate is very consistent for firms of different sizes, operating in different parts of the country, and operating in different industry classes (upon request, the corresponding author can provide more detailed information). The survey data were merged with data from Dun and Bradstreet, which provided data on firm size in number of employees, year of establishment, geographical location, and the industry (NACE code) in which each firm was operating.

2.2. Dependent Variables

Our concept of green strategy is grounded in green innovation research [1–3], we have noted, but we needed to develop items applicable to also include firms that are not explicitly innovative, and to study firms operating in a diverse set of industries beyond the manufacturing sector. Hence, to study the concept of green strategy empirically, we developed four new Likert-scale items anchored in responses varying between “strongly disagree” (1) and “strongly agree” (5). (For each item, the respondents could also respond “do not know/not relevant”.) The wording of the items is as follows (all items are translated from Norwegian): “We consult collaborators, governmental bodies, or interest groups concerning environmental improvements”, “We share information with competitors concerning environmental improvements”, “Environmental improvements have greater importance than short-term economic gains”, “Environmental improvements strengthen our earnings”. Principal component analysis, including the four items, returned an eigenvalue of 1.94 for the first factor (i.e., above 1) and 0.915 for the second factor (i.e., below 1). Following Kaiser [32], we, therefore, applied the four items to measure green strategy as a one-dimensional concept. The Cronbach’s [33] alpha for the four items returned a coefficient of 0.637. In the following analyses, we apply the mean score of the four items that we have used to measure the concept of green strategy.

The concept of new industry strategy, or cross-industry innovation as it is also labeled in the literature, is not much studied empirically [4], and to our knowledge, neither does there exist a universally agreed-upon operational definition of the concept. For our study, we, therefore, developed the three following questions, to which the respondents could respond “yes”, “no”, or “do not know”: “Has your firm during the last three years increased the sales in an industry to which you have previously had limited sales, i.e., less than 20% of the total sales?” “Has your firm during the last three years entered an industry that is totally new for you?” “Has your firm during the last three years entered an industry that is totally new for you, but where you have not yet had any sales?” Responding “yes” to one or more of the three questions was coded as a new industry strategy (coded 1). (Responding “no”, “do not know”, or no answer at all was coded 0.)

2.3. Independent Variables

When testing potential carriers for firms’ green strategies, we included new industry strategy as a control variable and vice versa. We have no strong theoretical rationale for assuming genuine associations between the concepts, but our motive for including them is grounded in an explorative approach. It, moreover, enables us to isolate the effect of other independent variables as potential carriers of green and new industry strategies, respectively.

To assess whether the firm had product or process innovation, we applied operational definitions similar to those used by the Oslo Manual [34,35]. Product innovation was measured by using the following question: “Has your firm during the last three years introduced a new or substantially improved product or service?” Process innovation was measured by using the following phrase and question: “Process innovation implies to start using new or substantially improved technology or methods of production, delivery, and distribution. Has your firm during the last three years introduced a new or substantially improved process innovation?” Responding “yes” to one or both of these questions was coded as a product or process innovation (coded 1). Responding “no”, “do not know”, or no answer at all was coded 0.

To assess whether the firm had interfirm innovation collaboration, we used operational definitions similar to those used by the Community Innovation Survey, CIS, which is carried out biannually by Statistics Norway in collaboration with Eurostat [36]. The respondents were presented the following question: “Has your firm during the last three years had collaboration with other firms or institutions concerning the development or improvements of products and processes?” Responding “yes” was coded as interfirm innovation collaboration (coded 1). Responding “no” or “do not know” was coded 0.

The survey was supplied by register data on each firm’s number of employees, which we used to measure size. The survey was further supplied by register data on each firm’s year of establishment. We subtracted the year of establishment by 2017, which gave us a measure of firm age in years. The data were provided by the Brønnøysund Register Centre, which is a Norwegian government agency responsible for numerous public registers in the country.

To assess whether the firm was independent or not, we included the following question in the survey: “Is your firm part of a larger corporation?” Responding “no” was coded as an independent firm (coded 1). Responding “yes, as a mother company” or “yes, as a daughter company” was coded 0 and all firms responded to one of the three alternatives.

To assess whether the firm had carried out layoffs, had had growth in employees, mergers or acquisitions, or had carried out cost reductions, we included the following questions in the survey: “Has your firm over the last three years developed in any of the following ways?” Responding “yes” to “Carried out layoffs” was coded positively (coded 1 and 0 for firms responding “no” or not responding at all). Responding “yes” to “Having had growth in employees” was coded positively (coded 1 and 0 for firms responding “no” or not responding at all). Responding “yes” to “Having had mergers or acquisitions” was coded positively (coded 1 and 0 for firms responding “no” or not responding at all). Responding “yes” to “Having carried out cost reductions” was coded positively (coded 1 and 0 for firms responding “no” or not responding at all).

As noted, Norway is divided into 89 economic regions. The division is consistent with the EU’s classification of local administrative units (LAU-1). To measure regional population density, we divided each economic region’s number of inhabitants by its extension in square kilometers. Statistics Norway provided the data.

3. Results

3.1. Descriptive Statistics and Correlations

We were able to model variables for 1160 firms (from a total of 1201 responding firms) located in 80 (of a total of 89) economic regions in Norway. Table 1 reports descriptive statistics and correlations. Concerning the concept of green strategy, it is interesting to note that the minimum value is 1, the maximum value is 5, and the mean value is 3.11; i.e., the concept is not much skewed in either direction. All the dummy or binary variables have 0 as a minimum value and 1 as a maximum value (in which “no” was coded as 0 and “yes” was coded as 1). Hence, the mean value 0.431 concerning the variable new industry strategy implies that 43.1% of the responding firms report that the firm has entered into a new industry, according to our operational definition of the concept. The continuous variables firm size in the number of employees, firm age in years, and regional population density were

skewed. We, therefore, applied the natural logarithm of these concepts. None of the correlations in Table 1 takes very high absolute values, which informs that potential problems with multicollinearity in later regressions are unlikely (cf. [37]).

3.2. Econometric Multilevel Modeling

To study our research question, we conduct multilevel random-intercept nested regression analyses (for further information, please see, e.g., [38–43]). Firms and firm characteristics are the lower-level unit, and economic regions are higher-level unit. Therefore, the population density of a particular economic region is constant for all firms located there, but the concept naturally varies across the 80 economic regions of our study. To study firms' green strategies, we particularly use a linear model because the green strategy concept is assumed to be a continuous and normally distributed variable. To study firms' new industry strategies, we particularly use a logistic model because the new industry strategy concept is a binary variable. In the two econometric models that we are to report, firms are nested in different industries (NACE codes at level two), and industries are nested in economic regions. The nested models imply that we control out the effect of operating in a particular industry. In fact, we control out the effect of operating in a particular industry in a particular economic region. In the results of the regression that we are to show, we report firms nested in industries and industries nested in regions as random effects (for further details about random intercept nested regression models, please see, for instance *ibid.*).

3.3. Regression Estimates

In Model 1 (Table 2), we observe that firms having entered into a new industry slightly increases their green strategies, but the effect is non-significant. Firms with product or process innovation and firms with interfirm innovation collaboration increase their green strategies. Firm size has a positive effect on green strategies, but firm age has a non-significant effect. Independent firms and firms having carried out layoffs, decrease their green strategies. Firms having had growth in employees, having carried out mergers or acquisitions, and having carried out cost reductions have non-significant effects on green strategies. Finally, we observe that location in densely populated regions has a significant negative effect on firms' green strategies. Significant Wald χ^2 indicates robust model fit. Significant likelihood ratio χ^2 indicates that there is less variation concerning the effect variable within industries nested in regions than between them.

In Model 2, we observe that firms with green strategies increase the probability of entering into a new industry, but the effect is non-significant. Firms with product or process innovation and firms with interfirm innovation collaboration increase their probability of entering into a new industry. For example, firms with interfirm innovation collaboration have 34% higher probability of entering into a new industry as compared to firms without such collaboration (cf. an odds ratio of 1.34, which we report in brackets). Firm size has a negative effect on firms' probability of entering into a new industry, and firm age has a non-significant effect. Independent firms and firms having carried out layoffs have non-significant effects on the dependent variable. Firms having had growth in employees, having carried out mergers or acquisitions and carried out cost reductions increase their probability of entering into a new industry. Finally, population density has a non-significant effect on the dependent variable. Significant Wald χ^2 indicates robust model fit. Significant likelihood ratio χ^2 indicates that there is less variation concerning the effect variable within firms nested in industries nested in regions than between them. It indicates that firms operating in some industries emphasize new industry strategies to a stronger degree than firms operating in other industries.

Table 1. Descriptive statistics and correlations.

Min.	Max.	Mean	SD		1	2	3	4	5	6	7	8	9	10	11
1	5	3.11	0.971	Green strategy (1)											
0	1	0.431	0.495	New industry strategy (2)	0.061 *										
0	1	0.749	0.434	Product or process innovation (3)	0.124 ***	0.191 ***									
0	1	0.640	0.480	Innovation collaboration (4)	0.136 ***	0.131 ***	0.303 ***								
1.61	8.04	2.93	0.925	Firm size in number of employees (ln) (5)	0.123 ***	−0.072 *	−0.012	0.067 *							
0	5.18	2.68	0.832	Firm age in years (ln) (6)	0.007	−0.069 *	−0.037	0.052	0.194 ***						
0	1	0.727	0.446	Independent firm (7)	−0.106 ***	0.006	−0.078 **	−0.049	−0.192 ***	−0.081 **					
0	1	0.341	0.474	Carried out layoffs (8)	−0.057	0.045	−0.024	0.044	0.084 **	0.061 *	−0.105 ***				
0	1	0.536	0.499	Growth in employees (9)	0.032	0.150 ***	0.132 ***	0.094 **	0.023	−0.186 ***	0.047	−0.300 ***			
0	1	0.159	0.366	Mergers or acquisitions (10)	0.068 *	0.115 ***	0.062 *	0.033	0.086 **	−0.005	−0.045	0.039	0.089 **		
0	1	0.681	0.466	Carried out cost reductions (11)	0.040	0.118 ***	0.069 *	0.122 ***	0.165 ***	0.087 **	−0.125 ***	0.376 ***	−0.158 ***	0.061 *	
0.273	7.31	3.86	1.45	Population density (ln)	−0.087 **	0.062 *	0.036	0.018	−0.008	0.006	0.006	0.108 ***	0.026	0.037	0.082 **

N = 1160. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, two-tailed tests of significance.

Table 2. Multilevel linear (1) and logistic (2) regression.

Dependent Variable →	1. Green Strategy	2. New Industry Strategy
Intercept	2.93 *** (0.171)	−1.68 *** (0.465)
Firm-level variables		
Green strategy		0.106 (0.070)
New industry strategy	0.088 (0.059)	
Product or process innovation	0.190 ** (0.068)	0.756 *** [2.13] (0.169)
Innovation collaboration	0.198 ** (0.061)	0.289 * [1.34] (0.146)
Firm size in number of employees (ln)	0.104 ** (0.032)	−0.239 ** [0.787] (0.078)
Firm age in years (ln)	−0.021 (0.035)	−0.102 (0.083)
Independent firm	−0.168 ** (0.064)	0.099 (0.152)
Carried out layoffs	−0.173 ** (0.065)	0.231 (0.157)
Growth in employees	−0.041 (0.061)	0.676 *** [1.97] (0.146)
Mergers or acquisitions	0.126 (0.076)	0.554 ** [1.74] (0.179)
Carried out cost reductions	0.050 (0.066)	0.581 *** [1.79] (0.158)
Regional-level variable		
Population density (ln)	−0.062 ** (0.021)	0.051 (0.049)
Random effects		
Residual	0.828 (0.042)	
Firms nested in industries	0.056 (0.027)	0.246 (0.151)
Industries nested in regions	0.000 (0.000)	0.000 (0.000)
Wald χ^2	76.4 ***	94.2 ***
Log likelihood	−1569.9	−730.9
Likelihood ratio χ^2	7.19 *	6.41 **
Number of firms	1160	1160
Number of regions	80	80

Notes: Standard errors in (parentheses). * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, conservative two-tailed tests of significance. Maximum variance inflation factor (VIF) is 1.28 in both models. For Model 2, we report odds ratios for significant regressors in [brackets].

4. Discussion

4.1. Summary of Significant Empirical Findings

In Table 3, we summarize the findings that receive significant empirical support. Both green and new industry strategies are pursued by firms that are innovative and having interfirm innovation collaboration. Green strategies are pursued by large firms and firms localized in sparsely populated regions, but they are avoided by independent firms and firms having carried out layoffs. New industry strategies are pursued by small firms, firms with growth in employees, and firms having carried out mergers or acquisitions and cost reductions.

Table 3. Summary of significant empirical findings.

	Green Strategy	New Industry Strategy
Product or process innovation	++	+++
Innovation collaboration	++	+
Firm size	++	–
Independent firm	–	
Carried out layoffs	–	
Growth in employees		+++
Mergers or acquisitions		++
Carried our cost reductions		+++
Regional population density	–	

One plus or minus indicates a significance level at 5%, two plusses or minuses at 1%, and three plusses or minuses at 0.1%.

Most of the significant empirical findings are consistent with our theoretical arguments. Concerning the association between carrying out cost reductions and the proclivity to enter into a new industry, we argued for either a positive or negative effect. Finding a positive empirical effect indicates that firms carrying out cost reductions have a proclivity to enter into new industries, due to their search for new market opportunities.

4.2. A Note on Non-Significant Effects

Despite observing negative effects from age on firms' green and new industry strategies, in line with our arguing, we observed that the effects were non-significant. Plausible explanations can be that other characteristics matter more than age, or that the sample size is too small to generate statistically significant results.

We further speculated whether firms having carried out layoffs would increase their probability of entering a new industry in search of market opportunities, but the regression estimate, despite a positive result, was non-significant. A plausible explanation can be that firms having carried out layoffs do not have the necessary capabilities to enter new a new market.

We also speculated whether firms having had growth in employees would have a positive green strategy effect, but we actually found a negative, albeit non-significant, effect. A plausible explanation can be that increasing the work stock puts certain constraints on a firm, and which removes its focus away from adopting green strategies.

In a similar vein, we observed that having carried out mergers or acquisitions did not induce a significant positive effect on firms' green strategies, possibly because it points a firm's focus in another direction. Finally, we speculated whether firms having carried out cost reductions would induce a negative effect on their green strategies, but we actually found a positive, albeit non-significant effect. A plausible explanation can be that there are motives beyond financial constraints for firms to carry out cost reductions, and which may partially explain the unexpected positive, albeit non-significant, result.

We did not argue for particular associations between being an independent firm and adopting a new industry strategy, and the statistical effect was non-significant. In a similar vein, we did not argue for a particular association between regional population density and adopting a new industry strategy, and the statistical effect was non-significant.

4.3. Theoretical Contribution and Policy Implications

Our study contributes to the scholarly literature as follows. Firstly, we have studied firms' green strategies, independent of whether they are developing genuinely new and innovative products or manufacturing processes or not. Today, there is an increasing amount of studies investigating green or

eco-innovations, but in our opinion, they do not take into account the vast amount of firms that are not explicitly innovative, according to a conventional understanding of the concept (for an overview of the literature of eco- and green innovations and definitions of the concept, please see [3]). Secondly, we have aimed to study firms' green strategies across numerous industries. Previous research has, for instance, investigated a limited range of manufacturing industries (e.g., [1,2]); however in our study, we have developed indicators applicable to measure green strategies that also include firms operating in service sectors. Thirdly, few studies have examined firms' new industry strategy [4], and to our knowledge, previous research has not studied the concept by analyzing a dataset covering numerous industries. Fourthly, we have aimed to better understand factors that explain how firms approach the dual challenges of adopting green strategies along with their proclivity to enter new industries.

Concerning policy implications, we argue that our findings can better equip managers and policymakers to tailor their efforts in the pursuit of both enabling firms to adopt green strategies and to enter into new industries. For instance, finding that knowledge-intensive firms adopt both green and new industry strategies should encourage stakeholders to proactively develop and foster industry actors with such capacities, both among newcomers and incumbent firms. Policymakers should also be aware that small and large firms play different roles concerning green and new industry strategies, and ideally, meeting places should be established where firms of different sizes can learn from each other. Most importantly, perhaps, our study has provided new knowledge concerning firm characteristics, and also regional localization, that increase or decrease their proclivity to adopt green strategies. This knowledge can be fruitful in the aim of helping firms to elaborate a corporate social responsibility strategy, or to implement an ISO 14001 environmental certification.

4.4. Limitations and Future Research

A limitation of this study is its cross-sectional research design, which reduces the internal validity for some (but not all) parameters. For example, finding that firms' green strategies and propensity to enter new industries are a function of product or process innovation and interfirm innovation collaboration, we cannot rule out potential reverse causalities. To take account of this limitation, future research should apply a longitudinal research design or apply estimations with appropriate instrumental variables. As we use perceptual indicators to measure a number of concepts, future research should also aim to incorporate additional measures from register data that provide information about financial status, employment status, ownership status, etc. That said, to our knowledge, data concerning innovation, innovation collaboration, and green strategies cannot be easily measured in large-scale studies by means other than informants' perceptual responses.

A related limitation is that we cannot rule out common method bias or variance (for further details, see [44]), but the inclusion of numerous independent variables reduces this potential limitation. Future research should, nonetheless, apply different and independent data sources, e.g., combining register data with survey data.

It is worth noting that common method bias or variance is not of concern regarding the negative association between regional population density and firms' green strategies. The reason is that the independent and the dependent variable are measured by using data from different and independent sources (regional data from Statistics Norway and survey data, respectively). We furthermore argue that the finding has a strong internal validity as it is more likely to assume that regional population density affects firms' green strategies rather than the other way around.

It is likewise worth noting that common method bias or variance is not of concern regarding the positive association between firm size and green strategies, and the negative association between firm size and the propensity to enter into new industries (data concerning firm size are gathered from register data, while data concerning green and new industry strategies are derived from the survey). It is also more likely to assume that firm size affects firms' green strategies and the propensity to enter into new industries, rather than the other way around. We nonetheless encourage future research to

also study the variables addressed here in longitudinal research design or to apply estimations with appropriate instrumental variables.

Research should finally aim to include other and more robust measures of firms' green strategies. A limitation of our study is that we have merely applied respondents' perceptions of the concept. Hence, we do not have substantial information about firms' de facto green strategies, and which is a topic for future research to address.

5. Conclusions

Our focus in this paper has been to study the dual challenges of Norwegian firms to adopt green and new industry strategies. Carrying out a multilevel study of firms operating in numerous industries throughout Norway, we find that indicators of knowledge intensity are carriers for both green and new industry strategies. Concerning other firm characteristics, such as size and indicators of firm robustness, the findings are mixed. Our study also shows that localization in sparsely populated regions has a positive effect on firms' proclivity to adopt green strategies.

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