

# Organization & Environment

## SME Managers' Perceptions of Competitive Pressure and the Adoption of Environmental Practices in Fragmented Industries: A Multi-Country Study in the Wine Industry

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| Journal:         | <i>Organization &amp; Environment</i>   |
| Manuscript ID    | OE-17-0126.R3   |
| Manuscript Type: | Empirical Research Article  |
| Keywords:        | Sustainability, Small and medium enterprise (SME), Upper echelons, Competitive dynamics, Fragmented industry  |
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## **RUNNING HEAD: SME MANAGERS' PERCEPTIONS OF COMPETITIVE PRESSURE & ADOPTION OF ENVIRONMENTAL PRACTICES**

### **SME Managers' Perceptions of Competitive Pressure and the Adoption of Environmental Practices in Fragmented Industries: A Multi-Country Study in the Wine Industry**

With climate change and intensifying weather conditions, pressure to attend to environmental issues is forcing small-and-medium sized enterprises (SMEs), and those who manage them, to rethink their sources of competitive advantage (Wiesner, Chadee, & Best, 2017). While firms experience pressure to adopt environmental practices from a number of different industry stakeholders, the competitive environment, including both direct competitors and industry associations, is particularly important to consider in the context of SMEs (Sen & Cowley, 2013), especially when competing in fragmented industries (Dess, 1987; Hofer, Cantor, & Dai, 2012; Jarl Borch & Brastad, 2003). While we have many studies that investigate how large firms attend and respond to competitive pressure to adopt environmental practices, we know much less about how and why SMEs in fragmented industries respond as they do to this pressure (Aragón-Correa, Hurtado-Torres, Sharma, & García-Morales, 2008; Wiesner et al., 2017). Furthermore, although research on SMEs has revealed that the adoption of environmental practices varies across industry contexts (Triguero, Moreno-Mondéjar, & Davia, 2016) and we know fragmented industries are dominated by SMEs (Dess, 1987), we have a limited understanding of how SMEs in fragmented industries respond to competitive pressure to adopt environmental practices.

It is important to investigate how SMEs in fragmented industries respond to competitive pressure, because of the unique challenges they face when addressing growing pressures to adopt environmental practices relative to firms in more consolidated industries. First, price wars are more common in fragmented industries than in consolidated industries, leading to boom-and-bust cycles where only those SMEs with a lower cost structure typically survive (Dess, 1987; Porter, 2008). Second, since fragmented industries are characterized by

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3 a large number of privately held firms (Dollinger, 1990) where "no firm has a significant  
4 market share and can strongly influence the industry outcome" (Porter, 1980: 191), SMEs in  
5 fragmented industries are less likely to be forced to adopt the practices of large competitors  
6 than in more consolidated industries. Third, because firms are less interdependent in  
7 fragmented industries than in more consolidated industries, the action of one SME typically  
8 does not directly affect another (Dess, 1987), making isomorphic pressure less salient to  
9 SMEs and instead heightening the importance of differentiation strategies (Jarl Borch &  
10 Brastad, 2003). While an action taken by a single firm does not directly affect another firm,  
11 SMEs in fragmented industries are likely to feel the most pressure to adopt environmental  
12 practices from competitors within a close geographic proximity, because these competitors  
13 compete with them directly for local customers, distributors, and shelf space at retail outlets  
14 (Jarl Borch & Brastad, 2003; Payne, Kennedy, & Davis, 2009). Many SMEs in fragmented  
15 industries respond to this volatility by joining local industry associations in the hopes of  
16 creating a more predictable competitive environment based on the sharing of information,  
17 joint marketing efforts, and joint political activity (Roy & Thérin, 2007; Worthington &  
18 Patton, 2005). However, SMEs may also experience pressure from these associations to  
19 adopt environmental practices (Ferron, Vilchez, Darnall, & Aragón Correa, 2017; Shah &  
20 Rivera, 2013; Worthington & Patton, 2005). These factors, unique to a fragmented industry  
21 context, may motivate SMEs to respond differently to competitive pressure than firms in  
22 more consolidated industries.

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Regardless of the objective nature of competition, upper echelons theory states it is actually managers' perception of this pressure that influences how they frame decisions and ultimately respond (Bromiley & Rau, 2016; Hambrick, 2007; Hitt & Tyler, 1991; Miller, Burke, & Glick, 1998). An upper echelons perspective argues that a firm is the reflection of its top executives, and investigates the extent to which its top executives matter due to "the

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3 choices of which products and markets to emphasize, how to outdo competitors, how fast to  
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5 grow, and so on” (Finkelstein, Hambrick, & Cannella, 2008: 19). Managers’ perceptions are  
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7 influenced by their training, experiences, and beliefs, which filter the information they  
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9 process when making decisions (Tyler & Steensma, 1998), and have been found to directly  
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11 and indirectly influence firms’ activities and performance (Hambrick, 2007; Hambrick &  
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13 Mason, 1984). More specifically, research shows that managers’ attention may be focused on  
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15 either opportunities or threats (Dutton & Jackson, 1987; Jackson & Dutton, 1988) and that  
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17 this focus of attention will filter the information considered when making decisions  
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19 (Bromiley & Rau, 2016; Ocasio, 1997). Furthermore, the intentions, values, experience, and  
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21 attention focus of top managers in SMEs have been found to have a stronger influence on  
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23 SMEs’ activities and performance than in larger firms (Entrialgo, 2002; Matzler, Schwarz,  
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25 Deutinger, & Harms, 2008), because the context of smaller firms is simpler and amplifies  
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27 their influence (Covin & Slevin, 1989).  
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31           Some research shows how perceptions influence the decisions of managers on  
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33 environmental practice adoption, but again this resides primarily within the context of large  
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35 firms (Aragón-Correa et al., 2008). SME managers care about environmental issues and  
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37 would like their firms to adopt environmental practices (Gadenne, Kennedy, & McKeiver,  
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39 2009; Tilley, 1999), and in general firms that balance short-term costs of operational changes  
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41 with long-term competitiveness benefits are better able to find “integrated solutions” that  
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43 permit the firm to mitigate costs (Slawinski & Bansal, 2012). However, in a fragmented  
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45 industry context, due to intense pressures to remain competitive, SME managers can fixate on  
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47 short-term costs of adopting environmental practices, perceiving greater costs than benefits  
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49 (Hofer et al., 2012; Temtime, 2008). Thus, although SMEs in fragmented industries could  
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51 benefit financially from adopting environmental practices, when faced with stronger  
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53 competitive pressure managers may focus their attention primarily on the competitive threats  
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3 associated with higher costs and the lack of opportunity to differentiate (Dutton & Jackson,  
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5 1987; Jackson & Dutton, 1988; Ocasio, 1997). This focus on threats can further heighten  
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7 their risk aversion (George, Wiklund, & Zahra, 2005), making them less willing to make  
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9 investments in environmental practices (Triguero et al., 2016). Yet we know little about how  
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11 SME managers' perceptions of competitive pressure in a fragmented industry influence their  
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13 decision making to adopt environmental practices, or how this relates to firm performance.  
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15 Thus, we ask: 1) How do managers' perceptions of competitive pressure to adopt  
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17 environmental practices influence SMEs' adoption of environmental practices in fragmented  
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19 industries, and 2) how do managers' perceptions of competitive pressure and SMEs' adoption  
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21 of environmental practices impact financial performance?  
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25 To investigate these questions, we analyze responses to a survey investigating  
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27 managers' perceptions of competitive pressure to adopt environmental practices, SMEs'  
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29 adoption of environmental practices, and SMEs' financial performance in the wine industry  
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31 across four countries. Our findings provide four primary contributions at the intersection of  
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33 competitive, upper echelons, and sustainability theories and practice. First, we explain why  
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35 SMEs in fragmented industries can be expected to respond differently to perceived  
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37 competitive pressure to adopt environmental practices than large firms or SMEs in more  
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39 consolidated industries. More specifically, we describe why SMEs in fragmented industries  
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41 should be less influenced by isomorphic pressures to conform to actions taken by competitors  
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43 than larger firms. These findings unpack the wide variance in SMEs' engagement in  
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45 sustainability, and reveal the need to study such engagement in different industry contexts.  
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47 Second, our study develops a more comprehensive and nuanced theoretical logic to explain  
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49 how, in fragmented industries, SME managers' perceptions of competitive pressures  
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51 influence their focus of attention on either competitive opportunities or competitive threats  
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53 and in turn make them more or less risk averse.  
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Third, we theorize and empirically assess how SME managers' perceptions of competitive pressure to adopt environmental practices moderate the relationship between adopted practices and financial performance. Although SME managers in fragmented industries are less likely to adopt environmental practices if they perceive more pressure to do so from competitors and industry associations, these managers also appear to be more likely to extract maximum operational and strategic value from such practices if adopted to better cope with this competitive threat. The latter finding is consistent with research claiming that the adoption of environmental practices leads to stronger financial performance (Albertini, 2013; Horváthová, 2010), which our findings extend by showing the positive moderating effect managers' perceptions can have on this relationship. Although these two results initially seem paradoxical, in fact SME managers that perceive strong competitive pressure appear to be consistent in their focus of attention on competitive threats. However, their logical response to this threat differs depending on the decision at hand: the decision as to whether to invest more in environmental practices or the decision as to whether to extract the maximum value from the environmental investments already made. Collectively, these results show the importance of examining SME managers' perceptions of their environment in the context of a fragmented industry.

Finally, we revise and refine the sub-scales previously proposed to assess environmental practices in the sustainability literature (Cassells & Lewis, 2011; Petts, Herd, & O'Heocha, 1998; Petts, 2000), place the items on a five-point Likert scale, and combine them into an aggregate index. Our research suggests that although the items in the four subscales developed in the literature can be combined to create a reliable overall environmental practices index, this index can be refined using factor analysis to produce a 25-item index consisting of six subscales. We encourage future research to assess environmental practices using this 25-item scale and determine the generalizability of the

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index and the six subscales revealed in our study of the wine industry.

We begin with a review of literature that has investigated the relationship between SMEs' adoption of environmental practices, performance, and their varied response to competitive pressure to adopt environmental practices. Then, we draw on upper echelons theory to develop two hypotheses, and describe our research context and the methodology used to test the hypothesized relationships. We conclude with a discussion of the study's results, contributions to theory and practice, limitations, and directions for future research.

### **THEORY DEVELOPMENT**

Research investigating sustainability in SMEs has demonstrated empirical links between the adoption of environmental practices and gains in operational efficiencies (Wu & Pagell, 2011) and innovative capabilities (Bos-Brouwers, 2010; Geffen & Rothenberg, 2000), both of which are positively related to financial performance (Albertini, 2013). Though this evidence shows there are competitive and performance benefits to SMEs' adoption of environmental practices, there is quite a bit of variance across SMEs as to whether or not a firm actually engages in sustainability (Hsiao, Chuang, & Huang, 2018; Triguero et al., 2016). A possible explanation for such variance is that there are many pressures from the external environment that SMEs face when deciding whether to adopt environmental practices. Across industry contexts, isomorphic pressure to conform to normative shifts toward sustainability in an industry may motivate some firms to adopt environmental practices to remain legitimate in the eyes of influential stakeholders, though this has been shown primarily in the context of large firms (Sen & Cowley, 2013; Williamson, Lynch-Wood, & Ramsay, 2006). Regulatory changes may also pressure SMEs to proactively adopt environmental practices in a variety of industry contexts (Barnett & King, 2008).

In a fragmented industry context, important sources of pressure to adopt

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environmental practices arise from competitors and industry associations<sup>1</sup> (Ferron et al., 2017; Jarl Borch & Brastad, 2003). For SMEs in fragmented industries, a perceived increase in pressure to adopt environmental practices intensifies already strong competitive pressure on profit margins, particularly from firms with slack resources that can more easily finance the adoption of environmental practices in the short-term in order to maintain competitiveness in the long-term (Jarl Borch & Brastad, 2003; Vermeulen, 2015).

Comparatively, SMEs in fragmented industries face more challenges in addressing growing competitive pressures to implement environmental practices, stemming from possible increased reputational damage, resource wars, and competitors that are front-runners in adjusting their value chain strategies to adopt environmental practices (Darnall, Henriques, & Sadowsky, 2010; Vermeulen, 2015). We suggest that SMEs in a fragmented industry respond differently to competitive pressure than large firms or SMEs in more consolidated industries, based on variance in managers' perceptions of competitive pressure and their focus of attention on threats or opportunities associated with the unique features of a fragmented industry. As SMEs dominate fragmented industries, and this is a common context for these types of firms, it is important to understand how and why SMEs respond to competitive pressure to adopt environmental practices in this context.

### **Effect of Perceptions on the Adoption of Environmental Practices**

Building on upper echelons theory and the unique features of a fragmented industry context, we suggest SME managers may be aware of increasing competitive pressure to adopt environmental practices, but not respond to it the same way large firms or SMEs in more consolidated industries typically respond. We theorize that the unique features of a fragmented industry focuses SMEs managers' attention on the competitive threats rather than

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<sup>1</sup> We consider competitive pressure to include both competitor firms and industry associations, because they both compete closely for customers and supply chain partners (Jarl Borch & Brastad, 2003; Payne et al., 2009; Shah & Rivera, 2013)

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the opportunities associated with adoption of environmental practices when they perceive strong competitive pressure, and this intensifies their focus of attention on the competitive risk involved in these investments (Jackson & Dutton, 1987; Sen & Cowley, 2013).

First, according to competitive theory, SME managers are more likely to perceive a fragmented industry structure as constituting a threat rather than an opportunity (Dess, 1987). We propose that the characteristics of a fragmented industry, including the propensity toward boom-and-bust cycles, lack of large firms who set prices, and less strategic interdependence between firms (Dess, 1987; Porter, 1980), focus SME managers' attention on the threats associated with maintaining a low cost structure when they perceive strong competitive pressure, and thus decrease their likelihood of adopting environmental practices.

A fragmented industry experiences boom-and-bust cycles as industry profits rapidly rise and fall, with new entrants flooding the market hoping to profit from the boom that occurs when demand is strong and profits are high. The flood of new entrants creates excess capacity and a price war, which depresses industry profits, forces some companies out of business, and deters potential new entrants (Porter, 1980; 2008). Because economic boom times in fragmented industries are often relatively short-lived, minimizing costs is the best strategy for a company that strives to be profitable in a boom and survive any subsequent bust (Dess, 1987; Porter, 2008). In this context, SME managers are more likely to focus their attention on the threats associated with high operating costs than potential long-term benefits of adopting environmental practices, particularly in the short-term (Jackson & Dutton, 1987; Temtime, 2008). These effects are compounded in SMEs, because managers tend to believe that the costs of adopting environmental practices cannot be added to the price paid by their customers (i.e., the costs cannot be transferred to the customer), and thus often do not see any benefit to lowering their profit margin or raising product prices in order to fund the adoption of environmental practices in the short-term (Simpson, Taylor, & Barker, 2004; Tilley, 1999;

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Williamson et al., 2006). Together, this suggests that SMEs in fragmented industries will limit their investment in environmental practices to minimize their costs in order to survive any subsequent bust (Hofer et al., 2012), when strong competitive pressure to adopt environmental practices focuses their attention on threats to short-term survival.

Furthermore, a fragmented industry is characterized by the presence of many privately held SMEs with few or no large firms that can set prices (Dollinger, 1990), and firms are less interdependent in terms of actions and strategies (Porter, 1980). In this context, SMEs do not adopt industry prices, because entry barriers are low and commodity-type products are difficult to differentiate (Dess, 1987; Jarl Borch & Brastad, 2003; Porter, 2008). Given these industry features, together with the threat of boom-and-bust cycles, we expect SME managers to perceive less benefit from bending to isomorphic pressures regarding sustainability, when maintaining low costs and differentiating from other SME competitors are perceived as the key to survival. Research has shown that larger firms, or SMEs in a more consolidated industry context with fewer competitors, may see value in adopting environmental practices to keep up with “ratcheting expectations” and maintain legitimacy in their industry (Bertels & Pelozo, 2009), conforming to isomorphic normative and regulatory pressures to adopt environmental practices (Sen & Cowley, 2013). However, in the context of a fragmented industry, maintaining low operational costs is perceived as the primary threat to survival for SMEs, and thus SME managers would be more likely to focus their attention on protecting market share and profits in the short-term through cost-saving and niche-filling strategies (Dutton & Jackson, 1988; Hofer et al., 2012; Jackson & Dutton, 1987; Williamson et al., 2006). Thus, we expect SME managers in fragmented industries to avoid the adoption of environmental practices as competitive pressure to do so intensifies, because their attention will become increasingly focused on the threats associated with maintaining a low cost structure or differentiating their strategy, both necessary to survive.

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Second, SME managers' aversion to risk should be intensified by their focus of attention on the threats associated with survival (Dutton & Jackson, 1988; Jackson & Dutton, 1987). They may also tend to be more risk averse to changes in practices and strategies due to resource constraints and a lack of experience with environmental practices, particularly as compared to larger firms (George et al., 2005). Though firms experience social pressures for conformity, managers' inexperience may generate a greater perceived risk of failure and the awareness that the SME is lacking the necessary human resources to adopt the new practices (George et al., 2005; Panwar, Nybakk, Pinkse, & Hansen, 2015; Sitkin & Pablo, 1992). When financial and human resources are limited and managers are focused on threats to their survival, SMEs may choose to adopt individual practices where managers deem them most likely to improve firm performance rather than an entire environmental management program (Côté, Booth, & Louis, 2006; Revell & Blackburn, 2007). This permits SME managers to carefully select and adopt individual practices, keeping a firm's operational costs low while still benefitting from the environmental practices selected, but avoiding the higher costs of adopting an entire environmental management system (Côté et al., 2006). Thus, SME managers in fragmented industries would be unlikely to adopt formal and large-scale environmental programs, due to their perceptions of high risk associated with the implementation of new environmental practices when they are focused on the competitive threats to their survival and lack experience with environmental practices (Panwar et al., 2015; Sitkin & Pablo, 1992).

Alternatively, when SME managers perceive weaker competitive pressure to adopt environmental practices, we expect SME managers' attention to be less focused on the threats associated with competition and instead more focused on the opportunities and benefits associated with adopting environmental practices (Dutton & Jackson, 1987; Jackson & Dutton, 1988; Ocasio, 1997). We expect managers will focus less on the need to lower their

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profit margin or raise product prices in order to fund the adoption of environmental practices in the short-term (Simpson et al., 2004; Tilley, 1999; Williamson et al., 2006), less on the boom-and-bust cycles and inability to set prices (Jarl Borch & Brastad, 2003; Porter, 2008), less on potential resource constraints (George, 2005), and less on their lack of experience with environmental practices, all reducing their risk aversion (George et al., 2005). Thus, we contend that SME managers' perceptions of weaker competitive pressure to adopt environmental practices in fragmented industries can make competitive threats in the short-term less salient, focus their attention on the opportunities and benefits of adopting environmental practices, and lower their risk aversion to investments in these practices resulting in greater adoption of environmental practices.

***Hypothesis 1:** In fragmented industries, SME managers' perceptions of weaker competitive pressure to engage in environmental sustainability will be positively related to SMEs' adoption of environmental practices.*

### **Joint Effects of Perceptions and Adoption on Financial Performance**

Additionally, we expect SME managers' perceptions of stronger competitive pressure to adopt environmental practices to positively moderate the effect of adopted environmental practices on financial performance. Although we expect perceived strong competitive pressure to discourage SME managers from adopting environmental practices, research has shown that increases in SMEs' adoption of environmental practices (regardless of the motivation) will increase their financial performance (Bos-Brouwers, 2010). In general, research has shown that there are many other factors besides pressure from competitors and associations that can motivate SMEs to adopt environmental practices in fragmented industries. These factors include isomorphic pressure from normative forces (Bertels & Pelozo, 2009), proactive responses to anticipated or actual regulatory changes (Barnett & King, 2008), pressure from local communities, customers and suppliers (Sen & Cowley, 2013; Williamson et al., 2006), and even SME managers' own attitudes toward

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environmental issues (Roxas & Coetzer, 2012). Thus, in fragmented industries, overall we expect that increases in SMEs' adoption of environmental practices, whatever the motivation to do so, will be positively related to increases in financial performance.

Given this, we posit that perceptions of strong competitive pressure will further enhance, or positively moderate, the relationship between adopted environmental practices and financial performance of SMEs in fragmented industries. Although SME managers who perceive stronger pressure from competitors and industry associations may be less motivated to adopt environmental practices overall, those same perceptions can be expected to motivate managers that have already adopted environmental practices to extract maximum value from those practices to better address the perceived competitive threat. That is, if environmental practices are adopted, managerial perceptions that many competitors are also strategically engaging in sustainability will focus their attention back to the threat of competition, and motivate SME managers to resourcefully find ways to gain operational efficiencies and engage in differentiating, niche-filling strategies with such practices, particularly in the context of a fragmented industry (Dutton & Jackson, 1987; Jackson & Dutton, 1988; Ocasio, 1997). SME managers' focus on protecting short-term performance is further augmented by the perceived need to survive ongoing boom-and-bust cycles in a fragmented industry context. Thus, SME managers that perceive stronger competitive pressure to adopt environmental practices will likely be more motivated to increase profit margin from those environmental practices they have adopted to gain operational efficiencies, differentiate, and compete in niche positioning than SME managers that perceive less competitive pressure.

***Hypothesis 2:** In fragmented industries, SME managers' perceptions of stronger competitive pressure will positively moderate the relationship between SMEs' adoption of environmental practices and their financial performance relative to competitors.*

## **RESEARCH CONTEXT AND METHODS**

### **Context: The Global Wine Industry**

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The global wine industry is a highly salient industry in which to investigate our questions for four main reasons. First, the global wine industry is primarily composed of SMEs, with a few large vineyard and winery firms intermixed with many smaller firms (Hamann, Smith, Tashman, & Marshall, 2017; Lahneman, 2015). As such, this industry is highly fragmented. Second, because wine producers typically grow grapes and produce consumable products, land management, production processes, product specifications and labeling, as well as sales are highly regulated (Dougherty, 2012), resulting in further fragmentation of the industry. The global wine industry is broken up into geographic regions, primarily segmented by climate, and typically associated with a country or region, and governed by international, federal, regional and state laws (Dougherty, 2012).

Third, because the foundations of the wine industry are agricultural, firms are dependent on the longevity and quality of agricultural resources, making climate change issues central to wine and grape producers (Charters, Spielmann, & Babin, 2017; Resco, Iglesias, Bardají, & Sotés, 2016). For example, recent research into the impact on viticulture practices of climate change in Spain shows that there should be substantial drying (precipitation reductions of more than 25%) and warming (temperature increases of 3-5%) by 2080, predicted to result in changes in the availability of water resources, pests, diseases, soils, and agricultural conditions (Resco et al., 2016).

Finally, the evolution of the global wine industry over time, involving the entire breadth of firms' value chains and the industry context, has been based on aspects of the natural environment (Orth, Lockshin, & d'Hauteville, 2007). In the wine industry, vineyard and winery management practices vary from region to region according to factors that impact the cultivation of grape crops, primarily *terroir*, which includes topography, climate, sun exposure, rainfall, and soil types of the particular location in which the grape crops are grown (Dougherty, 2012; Spielmann & Gélinas-Chebat, 2012). The geographical location and

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*terroir* of a vineyard hold implications for the viticulture practices employed, as well as particular aspects of sustainable viticulture that have a greater impact (Charters et al., 2017; Dougherty, 2012). Thus, firms in the global wine industry have both an historical basis in and current concerns related to the natural environment, making this industry an excellent context within which to consider links between managers' perceptions of the industry context, SMEs' adoption of environmental practices, and financial performance in SMEs.

### **Methods: Sample and Data Collection**

In 2016, researchers in four countries – Italy, France, Denmark, and the U.S. – solicited managers of firms in the wine industry in their countries to participate in an industry survey. Data were collected through a questionnaire, made up of five sections: a) company profile; b) strategy; c) perceived macro and industry environmental pressure; d) environmental management practices; e) demographic information. The questionnaire was first developed in English, subsequently translated into Italian, French, and Danish, and then back translated into English from each language to avoid any bias. As suggested by Brislin (1970), back-translation cannot be the only technique to minimize issues associated with lack of equivalence in multi-country surveys (Chidlow, Plakoyiannaki, & Welch, 2014). We therefore combined back-translation with other techniques, namely the pilot study and the use of independent reviewers, i.e., parties other than the translators, who reviewed the translated questionnaire. We used the same questionnaire across samples, although the process of gathering the data differed in each country depending on local circumstances. Nonetheless, the quantitative methods used are consistent with research methods in SMEs calling for cross-national studies (Mullen, Budeva, & Doney, 2009). In sum, the sample of surveys with complete data used in this study consists of 289 firms: 136 from Italy; 107 from France, 24 from Denmark; 22 from the U.S. To examine whether common method bias was an issue (Podsakoff, MacKenize, Lee, & Podsakoff, 2003), we conducted a principal component factor

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analysis, which revealed the presence of five distinct factors with eigenvalue greater than 1.0, rather than a single factor. The five factors together accounted for 69 percent of the total variance; the first (largest) factor did not account for a majority of the variance (27%). Thus, no general factor is apparent, suggesting common method bias was not a problem.

***U.S. sample.*** A random sample was drawn from the population of wineries found during an extensive online search in four states: North Carolina, Virginia, Oregon and California. A stratified sample of 1,000 firms from these four states were mailed post cards, telling the recipient that we would be contacting them by telephone to determine their willingness to participate in the study. Approximately 20% of the post cards were returned, suggesting that these firms were no longer in business. Students were hired to call the contacts for the remaining firms. They identified more firms that no longer existed, made multiple calls that were never returned, and found some potential participants unwilling to participate. By the end of 2016, 77 potential firm participants had agreed verbally to participate in the study. Of these, 27 completed the survey either online (Qualtrics) or by returning an e-mailed survey in the mail, resulting in a U.S. sample response rate of 35%. However, missing data in five of the surveys left a total U.S. sample for this study of 22. These regions in the U.S. are dominated by many small firms, with only a few larger firms, and thus present a fragmented industry market context (Hussain, Cholette, & Castaldi, 2008; Lahneman, 2015; Silverman, Castaldi, Baack, & Sorlien, 2002).

***Denmark sample.*** In Denmark, a co-author collaborated with the two Danish national wine associations to compile a list of their members and their wineries and vineyards. The associations also sent an e-mail to their members encouraging them to participate in the study. The total number of active wineries located in Denmark was 70, and all received the invitation to fill out the online questionnaire. Managers that had not replied within the first two weeks were then contacted by follow-up emails and phone calls. A total 51 respondents

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answered the questionnaire (response rate = 72%); however, after cleaning the data and checking for availability of data for the variables used in this study only 24 observations could be used, which accounts for 34% of all wineries and vineyards in Denmark. As exemplified by our sample, Denmark's wine industry is composed of mostly small firms and is a highly fragmented market (Toldam-Andersen & Becker, 2015).

**Italy sample.** In Italy, the total number of wineries and vineyards is slightly higher than 92,000. Given the significant number of firms, the survey focused on the ten main consortia located in five wine production regions (Emilia Romagna, Lombardia, Sicilia, Toscana, Veneto) accounting for almost 800 wineries. In all, 246 firms participated in the survey (response rate = 30.75%), but data for only 136 were used in this study due to missing values. Italy has a highly fragmented market as it is dominated by small firms (Hussain et al., 2008).

**France sample.** In France, the co-author was aware that managers at wineries and vineyards most likely would not reply to questions pertaining to their wine or operations by email or by mailed questionnaire. Thus, a market research firm was hired to conduct interviews to obtain the survey data. A random sample of wine firms in the wine producing areas of France was drawn based on an extensive online search (n = 2,723). Each wine region's sample was proportionate to the size it represents in terms of overall wine production in the country. From this listing, a random sample of 500 firms was contacted by telephone, out of which 107 agreed to participate in the study (21.4% of those called). Of those that agreed to participate, 100% completed the questionnaire with the assistance of trained interviewers. France also has a fragmented wine market (Hussain et al., 2008).

### **Dependent Variables**

**Environmental practices.** Consistent with Rossiter (2002), we took a very careful, detailed approach to the development of our scale for *Environmental practices*. We searched the literature for scales on environmental practices and found the list of practices used by

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Cassells and Lewis's (2011) in their exploratory study, originally derived from Petts (2000).

When we carefully reviewed the practices we found that many of the items needed to be modified to fit the context of the wine industry, and some had to be dropped because they were not relevant. Next, per Rossiter (2002) we reviewed the sustainability literature to see what other environmental practices might be relevant for our context and theory on sustainability in SMEs, brainstormed together, and talked with managers of vineyards and wineries to gain further feedback. This led to the addition of some new practices. Finally, we took the final items and piloted them in Italy with two winery managers, who proposed minor adjustments in the specific wording of a few items.

Cassells and Lewis (2011) used a three point scale of 1=no, 2=to some extent, and 3=yes, but combined the responses 'to some extent' and 'yes' into one they called 'yes'. They then counted the number of 'yes' responses in each of the four categories of environmental practices and used a  $\chi^2$  test to assess if these count measures were independent of firm characteristics such as size. Our measure consisted of 40 Likert scale items (see Appendix A), based on responses to the prompt: "For the following practices, please rate the extent to which your company has implemented each" (1 = Not at all; 2 = A little; 3 = Moderately; 4 = Significantly; 5 = Very significantly). We retained the five-point range reported for each item and created two measures for environmental practices. The first, used as the dependent variable to test Hypothesis 1 and the independent variable in Hypothesis 2, is a 25-item scale based on an exploratory factor analysis of the items in Appendix A. The second, based on the four categories of practices we developed and report in Appendix A, served as the dependent variable and independent variable used in a robustness check.

The exploratory factor analysis of the 40 items developed by the research team is described in the results section. This analysis resulted in a 25-item scale for *Environmental practices* with six identifiable factors reported in Table 1. The coefficient alphas for the six

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factors and the aggregated measure are as follows: signaling commitment to protecting natural environment (alpha = 0.93), waste management packaging design (alpha = 0.86), life cycle assessment of products (alpha = 0.80), transportation and fossil fuel efficiency (alpha = 0.80), waste management packaging disposal (alpha = 0.85), and restoration and conservation of natural habitats (alpha = 0.85), and environmental practices (alpha = 0.94).

The *Environmental practices* scale we develop is intended to be a reflective measure. Consistent with Edwards' (2011) summary of reflective measures, the six factors we constructed using exploratory factor analysis are argued to represent a single dimension where each item is designed to capture the construct in its entirety (dimensionality), the items correlate positively because they are designed as alternative indicators of the same underlying construct (internal consistency), construct validity centers on the extent to which the measures represent the construct of interest and serve as indicators of the construct (construct validity), and the construct underlies the measures and changes in the construct are expected to cause changes in the measures (causality). Given it is a reflective measure, it is appropriate to combine the six factors into a single scale.

[Insert Table 1 about here]

### **Dependent and Independent Variables**

***Environmental practices.*** The dependent variable for the model of the relationship between managers' perceptions of competitive pressure and the adoption of environmental practices (Hypothesis 1) is used as an independent variable in the models that test Hypothesis 2 (see the discussion on environmental practices above).

***Financial performance.*** The dependent variable for Hypotheses 2 is financial performance relative to the firm's primary competitors. Financial performance was assessed using three four-point Likert items on how respondents rated firm performance compared to primary competitors in terms of sales' growth, profitability and market share (alpha = 0.84).

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*Competitive pressure to adopt environmental practices.* To measure the degree to which respondents' perceived competitive pressure to engage in environmental practices, we asked: "Please rate the extent to which the following stakeholders influence your company's adoption of environmental sustainability practices" (1 = very little influence to 7 = very strong influence). The measure for the '*Competitive pressure*' was based on their combined response to (a) competitors and (b) industry associations (alpha = 0.72). We tested our second hypothesis using an interaction term for environmental practices and competitive pressure: *Environmental practices \* Competitive pressure*. We also used the single-item measure of the competitors' pressure as a robustness check, as discussed in the section on robustness checks.

### Control Variables

A number of controls were used to extract variance explained by macro-, industry, firm-, and manager- level factors. We controlled for the macro-environment in several ways. First, we included three binary variables (*France, Denmark, United States*) to capture the differences compared to Italy, which is used as the baseline. Second, because managers' perceptions of strategic issues may be strongly affected by legal requirements, we controlled for three kinds of legal pressure to adopt environmental practices that can be expected to influence the strategic decisions of firm management, namely (a) supra-national laws and legal requirements, (b) national laws and legal requirements, and (c) sub-national laws, using Likert scale items (1 = very little influence to 7 = very strong influence). Three single-item variables were therefore included: *International laws, National laws, and Sub-National laws*. Finally, given that the community is another macro environmental factor that can pressure firms to adopt environmental practices, *Community pressure to adopt environmental practices* was operationalized through a two-item scale based on respondents' perceptions of pressures from the local community and not-for-profit groups (alpha = 0.62).

At the industry level we included two control variables constructed based on the

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factor analysis conducted in Table 2, using similarly constructed Likert scale items (1 = very little influence to 7 = very strong influence). The measure for *Customer pressure* to adopt environmental practices was based on their combined response to (a) end customers and (b) distributors ( $\alpha = 0.74$ ). *Supplier pressure* to adopt environmental practices was a three-item scale, which combined responses to the influence exerted by (a) equipment manufacturer suppliers, (b) raw materials suppliers, and (c) landowners ( $\alpha = 0.83$ ).

Because firm characteristics are expected to influence our hypothesized relationships, we controlled for four firm-level attributes. We added a control for firm age, measured by the number of years since the firm was instituted (*Firm age*). Given that firm size is a proxy for the total resources available to the firm for adopting its strategy and thus may also affect its capacity to adopt environmental practices, we included the number of employees as a measure of size (*Firm size*). The difference between family and nonfamily firms was also controlled for, by adding a binary variable taking a value of 1 if the firm is family owned, 0 otherwise (*Family owned*). Because some firms in the sample were only wineries or only vineyards, we also included two binary variables: *Only winery* equals to 1 if the firm is only a winery and equals 0 otherwise; *Only vineyard* coded 1 if the firm is only a vineyard and 0 otherwise. Thus, the reference group, which does not appear in the tables, includes firms that are both winery and vineyard. Finally, we controlled for the *Managers' environmental attitudes*, using the last six items of the ten-item scale used by Cassells and Lewis (2011). Each item was framed as a statement to capture managers' sensitivity toward environmental issues specifically, perceptions of environmental regulation, benefits of environmental actions and their relevance to firm strategy ( $\alpha = 0.83$ )<sup>2</sup>.

## RESULTS

As noted above, before we could test our hypotheses, we needed to factor analyze the

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<sup>2</sup> The scale adopted for the study had ten items (Cassells & Lewis, 2011; Petts, 2000). However, a factor analysis of the items resulted in two factors. For simplicity we used only the last 6 items of the scale. Robustness checks using the two scales representing environmental attitude showed qualitatively the same results as those reported here.

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items posited to measures environmental practices and industry pressures. First, there were too many environmental practices items (40 items in all) to analyze using confirmatory factor analysis (Bentler & Chou, 1987). In addition, the items were based on a literature review and were exploratory (Kirkman & Rosen, 1997). Thus, we used exploratory factor analysis to assess whether the four subscales for environmental practices we created represented four distinct subscales. The first step was to factor analyze the 40 items. A varimax rotation resulted in 22 factors instead of the four factors theoretically constructed. Several items did not load on any of the factors and many factors had only a single load. These items were dropped from further analysis. A subsequent factor analysis of the 25 remaining items resulted in the six identifiable factors reported in Table 1. Second, to substantiate the use of the two-item scale for *Competitive pressure*, we took the seven items included in the survey that theoretically represented industry pressures – competitors, customers, and suppliers – and conducted an exploratory factor analysis with varimax rotation. Although these three industry pressures are conceptualized as formative measures characterized as describing three different dimensions or facets of industry pressures (Edwards, 2011), because to our knowledge these specific items have not been previously factor analyzed, we conducted an exploratory analysis to determine if the three industry pressure subscales should be kept separate in subsequent analyses (Nunnally & Bernstein, 1994). The three-factor solution reported in Table 2 lends support to our measures for competitor pressure, customer pressure, and supplier pressure.

[Insert Tables 2, 3, 4 & 5 about here]

We provide descriptive information about our data in Table 3. These descriptive statistics reveal that for our sample the average adoption of environmental practices was relatively high with a mean of 73.124 and a range of 26 (minimum) to 122 (maximum), while the mean for perceived competitive pressure (including the competitor and industry

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association items) to adopt environmental practices was relatively low at 5.595 with a range of 2 (minimum) to 14 (maximum). Thus, on average managers in our sample report a relatively high adoption of environmental practices and relatively low perceived competitive pressure to adopt such practices.

Table 4 reports the pairwise correlations among the variables used in the regression models. It is worth noting that the simple correlation between competitor and association pressure and adoption of environmental practices is lower than that of pressures from international and subnational laws, the community, customer, suppliers, and managers' attitudes toward environmental practices. These findings suggest that there are many other pressures that encourage SMEs to adopt environmental practices beside competitive pressure.

We test our hypotheses using OLS regression estimation methods. Results are shown in Table 5. While Models 1 and 2 use *Environmental practices* (calculated using 25 items) as the dependent variable, *Financial performance* is the dependent variable in Models 3 and 4.

To ensure that multicollinearity did not bias our results, we computed the average Variance Inflation Factors (VIFs) of all variables. All VIFs are far below the threshold of ten recommended by previous research, confirming that multicollinearity was not an issue. The Breusch-Pagan/Cook-Weisberg test for heteroskedasticity was marginally significant, indicating the null hypothesis of homoskedasticity could be rejected. For increased rigor, we present estimates obtained with robust standard errors; i.e., consistent with the possibility of heteroskedasticity. In the first column for each dependent variable (Models 1 and 3) only control variables are included. Model 2 tests our Hypothesis 1, by incorporating the direct effect of competitive pressure to adopt environmental practices on SMEs' adoption of environmental practices. Model 4 includes the interaction term *Environmental practices* \* *Competitive pressure* to test our Hypothesis 2 on the moderating effect of competitive pressure on the relationship between SMEs' adoption of environmental practices and

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3 financial performance. The inclusion of these variables substantially increases the overall  
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5 explanatory power of the models compared to those with control variables only.  
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8 Before examining the findings related to our hypotheses, it is worth noting the impact  
9  
10 of the control variables. Country pressures significantly affect the adoption of environmental  
11  
12 practices. Clearly, "New World" (*Denmark* and the *U.S.*) firms are less likely to adopt  
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14 environmental practices than firms in Italy (Models 1-2,  $p < .01$ ), while the firms in *France*  
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16 were not significantly different from those in Italy. No significant difference in perceived  
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18 financial performance can be ascribed to the country environment, except for a marginally  
19  
20 significant higher performance in France. Pressures from *International laws* are also found to  
21  
22 be positively associated with firm environmental practices (Models 1-2,  $p < .05$ ). *Community*  
23  
24 *pressure*, was also positively associated with the adoption of environmental practices (Model  
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26 2,  $p < .01$ ). Results reveal that our two other industry pressures – *Customer pressure* and  
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28 *Supplier pressure* – were also positively associated with the adoption of environmental  
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30 practices (Models 1-2,  $p < .01$ ). The coefficient for *Only winery* is negative and statistically  
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32 significant (Models 1-2,  $p < .01$ ), indicating that firms that are only wineries exhibit lower  
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34 levels of environmental practices as would be expected. In line with prior research (Cassells  
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36 & Lewis, 2011), attitudes toward environmental practices reported by managers (*Managers'*  
37  
38 *environmental attitudes*), are positively associated with the extent to which the SME has  
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40 adopted environmental practices (Models 1-2,  $p < .01$ ). In terms of performance effect of  
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42 environmental practices (Simpson et al., 2004; Gadenne et al., 2009), our findings are aligned  
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44 with prior studies by showing a positive and statistically significant effect of environmental  
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46 practices on financial performance (Models 3-4,  $p < .01$ ). A positive relationship is also found  
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48 between firm size and financial performance (Models 3-4,  $p < .05$ ).  
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53 Our first hypothesis suggests that weaker competitive pressure to adopt environmental  
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55 practices, as perceived by managers, is positively associated with SMEs' adoption of  
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environmental practices. Thus, we expect a negative relationship between stronger competitive pressure and adoption<sup>3</sup>. In Model 2 the coefficient for stronger *Competitive pressure* is negative and statistically significant (Model 2,  $p < .01$ ). Thus, Hypothesis 1 is supported. Testing Hypothesis 2 requires that we investigate the moderation effect of stronger perceived competitive pressure on the link between SMEs' adoption of environmental practices and financial performance. To avoid the problem of multicollinearity, the continuous variables used in these models were mean centered, both as stand-alone variables, and as components of the interactions (Aiken, West, & Reno, 1991). In Model 4 the interaction of SMEs' adoption of environmental practices and managers' perceptions of competitive pressure is positive and statistically significant ( $p < .05$ ). This finding supports Hypothesis 2 on the positive moderating role of perceptions of stronger competitive pressure to adopt environmental practices, indicating that managers' perceptions of higher competitive pressure strengthen the positive effect of adopted environmental practices on financial performance. We graph the interaction effect in Figure 1. Our interpretation of the moderating effect of managers' perceptions of competitive pressure on the relationship between SMEs' adoption of environmental practices and financial performance is graphically confirmed: the positive effect of environmental practices on financial performance becomes stronger for higher levels of managers' perceptions of competitive pressure for sustainability.

[Insert Figure 1 about here]

### **Robustness Checks**

To test the robustness of our findings, we conducted several additional analyses. First, we constructed an alternative overall measure of firm environmental practices that included all 40 items developed for this study. We calculated the extent to which the SMEs adopted

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<sup>3</sup> Given that weaker competitive pressure is the inverse of stronger competitive pressure, it was unnecessary to reverse code the related variables. A positive relationship between weaker pressure and practice adoption is synonymous to a negative relationship between a stronger pressure and practice adoption.

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environmental practices we categorized as follows: operational (11-item scale, Cronbach's alpha = 0.89); waste management (10-item scale, alpha = 0.88); design (9-item scale, alpha = 0.88); management (10-item scale, alpha = 0.92). Next, these four environmental practices sub-scales were combined to create an overall environmental practice index (alpha = 0.90), consistent with reflective scale construction (Edwards, 2011). We ran the regressions testing Hypotheses 1 and 2 using this 40-item environmental practices measure, shown in Table 6. The results of this analysis correspond to the findings using the 25-item scale, providing further support for our hypotheses and suggesting our findings are robust to different measures. Second, we explored alternative specifications of our model on the relationship between SME managers' perceptions of competitive pressure and environmental practices. Since the relationship between managers' perceptions of competitive pressure and SMEs' adoption of environmental practices may be nonlinear, the squared term of the competitive pressure variable was included to explore any curvilinear relationship. This variable was not statistically significant and did not increase the fit of the model. Additional tests of our models on the subsample of low versus high competitive pressure, based on the median values of the competitive pressure variable, did not reveal any significantly different effect on these subsamples, confirming the existence of a negative relationship between SME managers' perceptions of competitive pressure and environmental practices. Third, as an alternative measure for competitive pressure, we used a single-item variable, based on SME managers' perceived pressure to adopt environmental practices only from competitors (i.e., without considering industry associations). These results are consistent with our findings.

### **DISCUSSION AND CONCLUSION**

This study sought to deepen our understanding of how SME managers' perceptions of competitive pressure are related to their firms' adoption of environmental practices in the context of fragmented industries, and how these perceptions moderate the relationship

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3 between adopted practices and financial performance. Our findings make four primary  
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5 contributions at the intersection of competitive, upper echelons, and sustainability theories  
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7 and practice. First, our theoretical reasoning suggests three unique characteristics associated  
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9 with a fragmented industry that motivate SME managers to respond differently to perceived  
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11 competitive pressure to adopt environmental practices than do larger firms in general or  
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13 SMEs in more consolidated industries. Though in general SMEs lack slack resources as  
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15 compared to larger firms (Tilley, 1999), our findings suggest the important role of a  
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17 fragmented industry context in heightening SME managers' awareness of the need to guard  
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19 short-term profit margins in order to survive the common boom-and-bust cycles.  
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21 Additionally, SMEs in more fragmented industries are less likely to have large competitors  
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23 who set prices and are less interdependent than in more consolidated industries (Dess, 1987),  
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25 and thus will likely pursue a competitive advantage through pursuing niche-filling,  
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27 differentiation strategies vis-à-vis other SME competitors. Overall, our results suggest that  
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29 SMEs in a fragmented industry may not respond to such isomorphic pressures in the same  
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31 way, as guarding short-term costs is perceived as paramount for survival in fragmented  
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33 industries. Further research could examine SMEs in a less fragmented industry context,  
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35 where although SME managers will still be sensitive to short-term profit margins, they would  
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37 be less likely to fear boom-and-bust cycles than in a highly fragmented industry, and so could  
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39 lower their risk aversion to change and make them more open to balancing short-term costs  
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41 with the longer-term benefits of engaging in sustainability. Overall, we encourage future  
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43 research to consider in more depth how degrees of industry fragmentation may change the  
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45 behavior of SMEs with regard to the adoption of environmental strategies.  
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51 Second, our study contributes to sustainability and upper echelons theories by  
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53 developing a more comprehensive and nuanced theoretical logic to explain how, in  
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55 fragmented industries, SME managers' perceptions of competitive pressures influence their  
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3 focus of attention on either competitive opportunities or competitive threats and in turn make  
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5 them more or less risk averse. In our sample solicited from Italy, France, the U.S., and  
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7 Denmark, we find that SME managers are likely to adopt more environmental practices if  
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9 they perceive weaker competitive pressure. We posit that when SME managers in fragmented  
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11 industries perceive strong competitive pressure, they are motivated to avoid the adoption of  
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13 environmental practices due to their focus on competitive threats associated with the unique  
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15 features of a fragmented industry context. We argue this is because SME managers interpret  
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17 the competitive boom-and-bust cycles, inability to set prices, and lack of interdependence  
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19 among firms in fragmented industries as threats (Dess, 1987; Porter, 2008), which in turn  
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21 heightens their risk aversion to adopting new practices (George et al., 2005). We propose that  
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23 these factors focus managers' attention on the competitive threats they face when they  
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25 perceive competitive pressure to be strong. On the other hand, our theory and results suggest  
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27 that when competitive pressure is perceived as weak, SME managers are not as worried about  
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29 the short-term cost of adopting environmental practices and are less risk averse, and instead  
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31 focus more attention on the potential opportunities available from adopting such practices.  
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36 Third, we find that SMEs in a fragmented industry perceive pressure from many  
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38 stakeholders, including but not limited to competitors and industry associations, to adopt  
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40 environmental practices, and that in this context perceptions of stronger competitive pressure  
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42 to adopt environmental practices enhances the relationship between environmental practice  
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44 adoption and financial performance. In our sample, the SMEs that implemented  
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46 environmental practices reported stronger financial performance relative to their competitors,  
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48 as prior literature has suggested (Albertini, 2013). Our study deepens our understanding of  
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50 this relationship by demonstrating that such a positive moderating effect between practice  
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52 adoption and performance occurs only if SME managers perceived stronger competitive  
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54 pressure to adopt such practices.  
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3           This finding might appear paradoxical with our initial finding that environmental  
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5 practice adoption is associated with perceptions of weaker competitive pressure. However, it  
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7 becomes less so when you consider that SMEs are motivated to adopt environmental  
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9 practices by many other stakeholders, such as regulators, communities, suppliers, and  
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11 customers, and how the perception of strong competitive pressure can be expected to  
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13 consistently focus managers' attention on the threats associated with competition, which are  
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15 significant for an SME in a fragmented industry competing on slim profit margins. Our  
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17 findings suggest that the perception of a competitive threat motivates SME managers to  
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19 maximize the value creation opportunities available to them based on the environmental  
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21 practices they have already adopted, when they believe that many competitors are also  
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23 competing based on similar practices. In sum, these results suggest that perceived strong  
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25 competitive pressure focuses managers' attention on the potential threats in both situations,  
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27 so the apparent paradox is explained by the consistent focus of attention on threats based on  
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29 perceived strong competitive pressure.  
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33           Finally, we contribute to the sustainability literature by revising and refining  
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35 previously developed sub-scales (operational, waste management, design, and management)  
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37 to assess environmental practices in the sustainability literature (Cassells & Lewis, 2011;  
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39 Petts et al., 1998), place the items on a five-point Likert scale, and combine them into an  
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41 aggregate index that can be used reliably as a dependent or independent variable in  
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43 sustainability research. Our data suggests that, although the items in the four subscales  
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45 developed in the literature can be combined to create a reliable overall environmental  
46  
47 practices index (Appendix A), a 25-item index consisting of six subscales (transportation &  
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49 fossil fuel efficiency, restoration & conservation of natural habitats, waste management  
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51 packaging design, waste management packaging disposal, life cycle assessment of products,  
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53 and signaling environmental commitment) provides a more parsimonious scale with  
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identifiable sub-scales (Table 1). We encourage future research to assess environmental practices using this 25-item index to determine generalizability to other industries.

We recognize that our study has limitations. First, the data used in the study is from a single industry, the wine industry, which is agricultural in nature. Thus, we should be cautious in generalizing our conclusions to other industries, particularly those not based in agriculture. However, we posit that the wine industry is comparable to many fragmented industries dominated by SMEs (Hamann et al., 2017), and thus serves as an appropriate context for the objectives of this study. Second, although our context was the global wine industry, our sample only includes data from four countries, whereas many other countries are active wine producers. We limited the number of countries in the sample due to the complexity of data collection, language issues (e.g., more translation and back translation and inefficiencies in trying to use a software to collect data in multiple languages), and increased coordination costs. We encourage future research to replicate and extend our contributions using larger samples, sampling from more countries, and different industry contexts. Third, data collection efforts were particularly challenging in the U.S. where managers were less willing to participate in an online survey and in Denmark where there are only 70 firms in the industry, resulting in small sub-sample sizes in two countries. However, the coefficient alphas for our scales suggest that the multi-country data collected was internally reliable, and we were able to control for differences in the country sub-samples. Fourth, the regressions with financial performance as the dependent variable explain a low variance, suggesting the potential that these findings, while empirically significant, may not have practical significance. However, this is not an uncommon finding when studying firm performance, particularly for SMEs in fragmented industries where any number of factors can be expected to impact financial performance. Fifth, we measured perceived competitive pressure with self-reported data through a survey instrument, for which retrospective and response biases

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are possible (Podsakoff et al., 2003). Additionally, we theorize that perceived strong competitive pressure to adopt environmental practices will focus SME managers' attention on competitive threats and weaker perceived pressure will focus their attention on opportunities to lower costs and differentiate. However, we do not measure perceptions of threats or opportunities. Thus, there is opportunity for future research to directly measure managers' focus of attention and further explore the links between managers' perceptions of competitive pressure, their focus of attention based on threat and opportunity framing, and adoption of environmental practices. Finally, to inform our theorizing, we drew on prior research showing that environmental practices often incur a short-term cost for implementing firms, which we theorize can be a deterrent for SMEs in fragmented industries to adopt such practices. However, we acknowledge that our survey did not specify costs associated with the adoption of specific practices, the amount of cost associated with the practices we consider vary widely, and that some short term costs can be very quickly recouped (e.g., reduce fuel consumption). Thus, future research could test our hypotheses with survey items that specify the dollar amount of short-term costs associated with specific practices.

Future research can address these limitations and extend our findings. Primary among these opportunities is to test the boundary conditions of our findings by examining variance in how SME managers perceive competitive pressure and its effect on the decision to adopt environmental practices, looking at moderating factors, or different dependent variables. Perhaps there are particular industry contexts, apart from the wine industry, in which strong competitive pressure would motivate SME managers to adopt environmental practices, because they do perceive that the adoption of environmental practices will directly benefit their SME's financial performance. Future research could also look at how SME managers' perceptions of pressure from other stakeholder groups, such as regulators, customers, and media, might negatively or positively affect the SME in terms of other measures of success,

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such as market or sustainability performance. Finally, our study suggests that comparing SMEs in fragmented and non-fragmented industries would be an excellent context within which to extend upper echelons theory's consideration of how managers' perceptions of competitive threats and opportunities shift their attention focus.

In conclusion, this study draws on competitive and upper echelons theories to contribute to sustainability research by theorizing and empirically testing hypotheses on how, in a fragmented industry, SME managers' perceptions of competitive pressure are related to SMEs' adoption of environmental practices and how these perceptions moderate the relationship between SMEs' adopted environmental practices and financial performance. With much prior research focusing on large firms, we hope this study encourages future research to engage in further exploration of the motivations for and outcomes of sustainability in SMEs. In particular, we anticipate future research will explore the important influence of managerial perceptions on SME managers' relative focus of attention on threats or opportunities, as well as test the composite environmental practices index we created across a greater geographical scope and different industry contexts.

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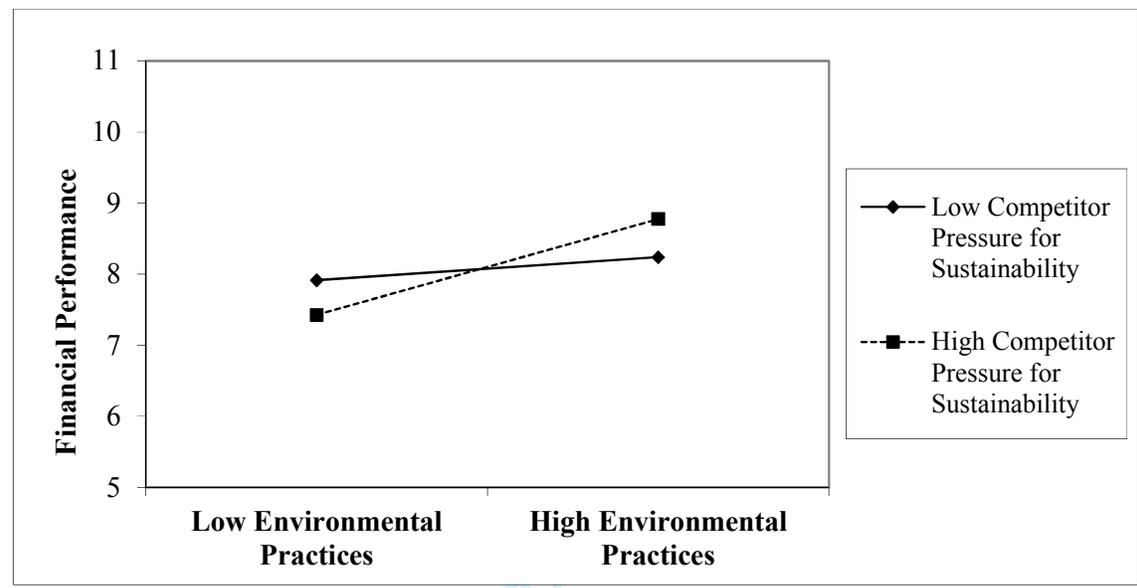
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## FIGURE AND TABLES

### Figures

Figure 1: The moderating effect of perceived competitive pressure for sustainability on the relationship between the adoption of environmental practices and financial performance



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**Table 1: Results of Factor Analysis (Environmental Practices - Varimax Rotation (N =289))**

|  | Signaling<br>commitment<br>to protecting<br>natural<br>environment | Waste<br>management<br>(packaging<br>design) | Life cycle<br>assessment<br>of products | Transportation<br>& fossil fuel<br>efficiency | Waste<br>management<br>(packaging<br>disposal) | Restoration<br>&<br>conservation<br>of natural<br>habitats |
|--|--|--|---|---|--|--|
| <b>Eigenvalue</b>  | <b>5.30</b>  | <b>2.72</b>                                  | <b>2.23</b>                             | <b>2.12</b>                                   | <b>1.81</b>                                    | <b>1.54</b>  |
| <b>Cumulative percent of variance explained</b>            | <b>0.32</b>  | <b>0.49</b>                                  | <b>0.63</b>                             | <b>0.76</b>                                   | <b>0.87</b>                                    | <b>0.96</b>  |
| Have an environmental policy statement                     | <b>0.73</b>  | 0.15   | 0.19                                    | 0.17  | 0.13   | 0.13   |
| Have staff with environmental responsibilities             | <b>0.67</b>  | 0.15   | 0.33                                    | 0.09  | -0.03  | 0.05   |
| Engage in environmental audits                             | <b>0.72</b>  | 0.17   | 0.06                                    | 0.13  | 0.09   | 0.23   |
| Have an environmental management system                    | <b>0.79</b>  | 0.24   | 0.21                                    | 0.01  | 0.07   | 0.06   |
| Market the firm based on claims related to the environment | <b>0.73</b>  | 0.03   | 0.14                                    | 0.21  | 0.11   | 0.07   |
| Have an environmental purchasing policy                    | <b>0.57</b>  | 0.18   | 0.31                                    | 0.20  | 0.17   | 0.19   |
| Evaluate the environmental performance of suppliers        | <b>0.56</b>  | 0.21   | 0.33                                    | 0.25  | 0.17   | 0.13   |
| Collect data related to environmental issues               | <b>0.62</b>  | 0.27   | 0.32                                    | 0.08  | 0.04   | 0.09   |
| An externally certified environmental management system    | <b>0.72</b>  | 0.17   | -0.01                                   | 0.01  | 0.09   | 0.15   |
| Engage in environmental/eco-labelling                      | <b>0.63</b>  | 0.07   | 0.11                                    | 0.11  | -0.04  | 0.23   |
| Dispose of solid/wastes in environmentally friendly way    | 0.15   | <b>0.54</b>                                  | 0.06                                    | 0.11  | 0.02   | 0.17   |
| Introduce packaging from recycled materials                | 0.16   | <b>0.80</b>                                  | 0.08                                    | 0.10  | 0.12   | 0.12   |
| Reduce product packaging                                   | 0.14   | <b>0.64</b>                                  | 0.14                                    | 0.26  | 0.29   | 0.12   |
| Set targets for waste reduction                            | 0.32   | <b>0.56</b>                                  | 0.37                                    | 0.19  | 0.24   | -0.04  |
| Use of recycled materials                                  | 0.27   | <b>0.53</b>                                  | 0.31                                    | 0.21  | 0.25   | 0.14   |
| Implement new technology to reduce impact                  | 0.28   | 0.17   | <b>0.59</b>                             | 0.22  | 0.20   | 0.14   |
| Design products to be easy to repair/last longer           | 0.26   | 0.11   | <b>0.74</b>                             | 0.15  | 0.26   | 0.12   |
| Design products to be easy to recycle                      | 0.21   | 0.40   | <b>0.55</b>                             | 0.24  | -0.02  | 0.22   |
| Reduce fuel costs  | 0.13   | 0.19   | 0.08                                    | <b>0.60</b>                                   | 0.17   | 0.15   |
| Changes in distribution to improve fuel efficiency         | 0.12   | 0.19   | 0.17                                    | <b>0.91</b>                                   | 0.07   | 0.09   |
| Change methods of transportation to reduce emissions       | 0.20   | 0.19   | 0.29                                    | <b>0.55</b>                                   | 0.16   | 0.12   |
| Take back packaging  | 0.10   | 0.17   | 0.10                                    | 0.11  | <b>0.85</b>                                    | 0.04   |
| Take back end-of-life products                             | 0.11   | 0.19   | 0.21                                    | 0.17  | <b>0.77</b>                                    | 0.03   |
| Restore contaminated soil                                  | 0.33   | 0.16   | 0.16                                    | 0.18  | 0.02   | <b>0.72</b>  |
| Protect ecologically sensitive habitats                    | 0.25   | 0.28   | 0.16                                    | 0.15  | 0.08   | <b>0.78</b>  |

LR test: independent vs. saturated:  $\chi^2(300) = 4543.59$  Prob> $\chi^2 = 0.0000$

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**Table 2: Results of Factor Analysis (Industry Pressures - Varimax Rotation) (N =289)**

|   | Supplier Pressure | Customer Pressure | Competitive Pressure |
|---|-------------------|-------------------|----------------------|
| <b>Eigenvalue</b>                               | <b>1.74</b>       | <b>1.24</b>       | <b>0.90</b>          |
| <b>Cumulative percent of variance explained</b> | <b>0.51</b>       | <b>0.86</b>       | <b>1.12</b>          |
| Competitors                                     | 0.22              | 0.45              | <b>0.55</b>          |
| Industry associations                           | 0.32              | 0.20              | <b>0.58</b>          |
| End consumers                                   | 0.17              | <b>0.65</b>       | 0.20                 |
| Distributors                                    | 0.31              | <b>0.63</b>       | 0.21                 |
| Equipment manufacturers                         | <b>0.74</b>       | 0.21              | 0.23                 |
| Raw materials suppliers                         | <b>0.79</b>       | 0.26              | 0.25                 |
| Land owners                                     | <b>0.55</b>       | 0.21              | 0.25                 |

**LR test: independent vs. saturated:  $\chi^2(21) = 860.12$  Prob> $\chi^2 = 0.0000$**

**Table 3: Descriptive statistics**

| Variable                          | Mean   | Std. Dev. | Min | Max |
|-----------------------------------|--------|-----------|-----|-----|
| Financial Performance             | 8.200  | 2.024     | 3   | 12  |
| Environmental practices           | 73.124 | 20.881    | 26  | 122 |
| Competitive Pressure              | 5.595  | 3.063     | 2   | 14  |
| Italy                             | .470   | .5        | 0   | 1   |
| France                            | .370   | .483      | 0   | 1   |
| Denmark                           | .083   | .276      | 0   | 1   |
| United States                     | .076   | .265      | 0   | 1   |
| Pressure from International Laws  | 4.269  | 2.105     | 1   | 7   |
| Pressure from National Laws       | 4.858  | 1.919     | 1   | 7   |
| Pressure from Sub-national laws   | 4.671  | 1.987     | 1   | 7   |
| Community Pressure                | 5.910  | 3.136     | 2   | 14  |
| Customer Pressure                 | 7.989  | 3.488     | 2   | 14  |
| Supplier Pressure                 | 7.806  | 4.362     | 3   | 21  |
| Firm age                          | 51.913 | 68.578    | 0   | 760 |
| Firm size                         | 10.692 | 27.342    | 0   | 300 |
| Family owned                      | .865   | .342      | 0   | 1   |
| Only winery                       | .072   | .260      | 0   | 1   |
| Only vineyard                     | .044   | .207      | 0   | 1   |
| Managers' Environmental Attitudes | 30.024 | 7.835     | 6   | 42  |

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**Table 4: Pairwise correlations**

|                                      | 1     | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10    | 11    | 12    | 13    | 14    | 15    | 16    | 17    | 18   | 19 |  |
|--------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|----|--|
| 1 Financial Performance              | 1     |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |      |    |  |
| 2 Environmental Practices            | 0.24  | 1     |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |      |    |  |
| 3 Competitive Pressure               | 0.03  | 0.13  | 1     |       |       |       |       |       |       |       |       |       |       |       |       |       |       |      |    |  |
| 4 Italy                              | -0.00 | 0.28  | 0.05  | 1     |       |       |       |       |       |       |       |       |       |       |       |       |       |      |    |  |
| 5 France                             | 0.12  | -0.03 | -0.02 | -0.72 | 1     |       |       |       |       |       |       |       |       |       |       |       |       |      |    |  |
| 6 Denmark                            | -0.09 | -0.26 | -0.06 | -0.28 | -0.23 | 1     |       |       |       |       |       |       |       |       |       |       |       |      |    |  |
| 7 United States                      | -0.11 | -0.20 | 0.02  | -0.27 | -0.22 | -0.09 | 1     |       |       |       |       |       |       |       |       |       |       |      |    |  |
| 8 International Laws                 | 0.11  | 0.24  | 0.25  | 0.06  | 0.12  | -0.06 | -0.27 | 1     |       |       |       |       |       |       |       |       |       |      |    |  |
| 9 National Laws                      | 0.08  | 0.12  | 0.25  | -0.12 | 0.26  | -0.13 | -0.11 | 0.75  | 1     |       |       |       |       |       |       |       |       |      |    |  |
| 10 Sub-national Laws                 | 0.08  | 0.14  | 0.26  | -0.09 | 0.27  | -0.18 | -0.13 | 0.72  | 0.89  | 1     |       |       |       |       |       |       |       |      |    |  |
| 11 Community                         | 0.04  | 0.28  | 0.61  | 0.13  | -0.07 | -0.11 | -0.00 | 0.30  | 0.28  | 0.37  | 1     |       |       |       |       |       |       |      |    |  |
| 12 Customer                          | 0.12  | 0.36  | 0.50  | 0.19  | -0.09 | -0.06 | -0.12 | 0.34  | 0.21  | 0.24  | 0.44  | 1     |       |       |       |       |       |      |    |  |
| 13 Supplier                          | 0.08  | 0.33  | 0.53  | 0.23  | -0.15 | -0.10 | -0.05 | 0.21  | 0.14  | 0.19  | 0.53  | 0.49  | 1     |       |       |       |       |      |    |  |
| 14 Firm Age                          | 0.02  | 0.01  | -0.06 | 0.04  | 0.14  | -0.18 | -0.15 | 0.04  | 0.03  | 0.03  | -0.05 | 0.02  | -0.13 | 1     |       |       |       |      |    |  |
| 15 Firm Size                         | 0.16  | 0.09  | -0.02 | 0.09  | -0.07 | -0.11 | 0.07  | -0.02 | -0.03 | -0.07 | -0.03 | 0.01  | -0.02 | 0.13  | 1     |       |       |      |    |  |
| 16 Family Owned                      | -0.02 | -0.05 | -0.11 | -0.07 | -0.01 | 0.05  | 0.11  | -0.03 | 0.00  | -0.01 | -0.09 | -0.09 | -0.07 | -0.02 | -0.16 | 1     |       |      |    |  |
| 17 Only Winery                       | -0.03 | -0.07 | 0.06  | 0.14  | -0.16 | -0.08 | 0.12  | -0.04 | -0.06 | -0.03 | 0.07  | 0.07  | 0.13  | 0.01  | 0.06  | -0.28 | 1     |      |    |  |
| 18 Only Vineyard                     | -0.04 | -0.06 | -0.08 | -0.10 | -0.03 | 0.06  | 0.19  | -0.15 | -0.09 | -0.07 | -0.03 | -0.10 | -0.11 | -0.10 | 0.12  | -0.01 | -0.06 | 1    |    |  |
| 19 Managers' Environmental Attitudes | -0.00 | 0.23  | -0.13 | 0.09  | -0.13 | 0.05  | 0.02  | -0.04 | -0.01 | -0.02 | -0.03 | 0.05  | -0.06 | 0.01  | 0.05  | 0.05  | -0.05 | 0.02 | 1  |  |

Significant 5% at +/- 0.11

## RUNNING HEAD: SME MANAGERS' PERCEPTIONS OF COMPETITIVE PRESSURE & ADOPTION OF ENVIRONMENTAL PRACTICES

**Table 5: OLS regressions, dependent variable in Model 1 & 2 is 25-item scale for Environmental Practices, dependent variables in Model 3 & 4 is Financial Performance**

|  | Model 1    | Model 2    | Model 3  | Model 4  |
|--|------------|------------|----------|----------|
| Competitive Pressure                         |            | -1.173***  | -0.008   | 0.004    |
|  |            | [0.437]    | [0.057]  | [0.149]  |
| Competitive Pressure*Environmental Practices |            |            |          | 0.004**  |
|  |            |            |          | [0.002]  |
| Environmental Practices (25 items)           |            |            | 0.021*** | 0.020*** |
|  |            |            | [0.008]  | [0.008]  |
| France                                       | -1.793     | -1.360     | 0.508*   | 0.544**  |
|  | [2.668]    | [2.661]    | [0.273]  | [0.271]  |
| Denmark                                      | -21.374*** | -20.851*** | 0.049    | 0.008    |
|  | [3.767]    | [3.683]    | [0.517]  | [0.498]  |
| United States                                | -14.048*** | -12.936*** | -0.336   | -0.241   |
|  | [3.834]    | [3.700]    | [0.654]  | [0.667]  |
| Pressure from International Laws             | 1.824**    | 1.748**    | 0.007    | 0.015    |
|  | [0.863]    | [0.852]    | [0.089]  | [0.088]  |
| Pressure form National Laws                  | -0.609     | -0.182     | -0.005   | -0.020   |
|  | [1.416]    | [1.354]    | [0.108]  | [0.110]  |
| Pressure from Sub-national Laws              | -1.097     | -1.395     | 0.026    | 0.027    |
|  | [1.350]    | [1.317]    | [0.101]  | [0.104]  |
| Community Pressure                           | 0.634*     | 1.088***   | -0.024   | -0.035   |
|  | [0.357]    | [0.394]    | [0.048]  | [0.046]  |
| Customer Pressure                            | 0.998***   | 1.255***   | 0.031    | 0.041    |
|  | [0.339]    | [0.336]    | [0.047]  | [0.046]  |
| Supplier Pressure                            | 0.792***   | 0.964***   | 0.006    | -0.005   |
|  | [0.262]    | [0.273]    | [0.037]  | [0.036]  |
| Firm Age                                     | -0.014     | -0.015     | -0.001   | -0.001   |
|  | [0.012]    | [0.012]    | [0.001]  | [0.001]  |
| Firm Size                                    | 0.049      | 0.048      | 0.012**  | 0.013**  |
|  | [0.047]    | [0.043]    | [0.005]  | [0.005]  |
| Family Owned                                 | -1.119     | -1.709     | 0.162    | 0.128    |
|  | [3.552]    | [3.567]    | [0.330]  | [0.329]  |
| Only Winery                                  | -9.092***  | -9.455***  | 0.043    | -0.003   |
|  | [3.224]    | [3.248]    | [0.502]  | [0.504]  |
| Only Vineyard                                | 1.439      | 0.893      | -0.255   | -0.346   |
|  | [4.361]    | [4.430]    | [0.521]  | [0.541]  |
| Managers' Environmental Attitudes            | 0.661***   | 0.606***   | -0.013   | -0.009   |
|  | [0.181]    | [0.182]    | [0.018]  | [0.018]  |
| Constant                                     | 40.948***  | 43.034***  | 7.924*** | 7.887*** |
|  | [7.707]    | [7.722]    | [0.835]  | [0.856]  |
| R-squared                                    | 0.344      | 0.359      | 0.103    | 0.121    |
| Adj.R-squared                                | .308       | .321       | .046     | .062     |
| No of Obs                                    | 289        | 289        | 289      | 289      |
| F test                                       | 12.573***  | 14.219***  | 1.521*   | 1.739**  |

\* p<0.1, \*\* p<0.05, \*\*\* p<0.01

## RUNNING HEAD: SME MANAGERS' PERCEPTIONS OF COMPETITIVE PRESSURE & ADOPTION OF ENVIRONMENTAL PRACTICES

**Table 6: OLS regressions, dependent variable in Model 1 & 2 is 40-item scale for Environmental Practices, dependent variables in Model 3 & 4 is Financial Performance**

|   | Model 1    | Model 2    | Model 3  | Model 4  |
|---|------------|------------|----------|----------|
| Competitive Pressure                          |            | -1.889***  | -0.005   | 0.007    |
|   |            | [0.683]    | [0.056]  | [0.053]  |
| Competitive Pressure* Environmental Practices |            |            |          | 0.003**  |
|   |            |            |          | [0.001]  |
| Environmental practices (40 items)            |            |            | 0.015*** | 0.014*** |
|   |            |            | [0.005]  | [0.005]  |
| France  | -4.589     | -3.892     | 0.536*   | 0.570**  |
|   | [4.165]    | [4.146]    | [0.273]  | [0.271]  |
| Denmark                                       | -33.029*** | -32.187*** | 0.086    | 0.031    |
|   | [5.846]    | [5.716]    | [0.517]  | [0.497]  |
| United States                                 | -18.426*** | -16.636*** | -0.361   | -0.258   |
|   | [6.118]    | [5.909]    | [0.651]  | [0.663]  |
| Pressure from International Laws              | 2.765**    | 2.642**    | 0.004    | 0.013    |
|   | [1.330]    | [1.312]    | [0.089]  | [0.087]  |
| Pressure from National Laws                   | -0.690     | -0.001     | -0.009   | -0.028   |
|   | [2.175]    | [2.061]    | [0.107]  | [0.108]  |
| Pressure from Sub-national Laws               | -1.550     | -2.030     | 0.027    | 0.032    |
|   | [2.081]    | [2.009]    | [0.099]  | [0.103]  |
| Community Pressure                            | 0.824      | 1.555**    | -0.024   | -0.036   |
|   | [0.563]    | [0.613]    | [0.048]  | [0.046]  |
| Customer Pressure                             | 1.606***   | 2.020***   | 0.028    | 0.038    |
|   | [0.537]    | [0.533]    | [0.047]  | [0.046]  |
| Supplier Pressure                             | 1.251***   | 1.528***   | 0.004    | -0.006   |
|   | [0.405]    | [0.423]    | [0.037]  | [0.036]  |
| Firm Age                                      | -0.020     | -0.021     | -0.001   | -0.001   |
|   | [0.019]    | [0.019]    | [0.001]  | [0.001]  |
| Firm Size                                     | 0.080      | 0.078      | 0.012**  | 0.013**  |
|   | [0.060]    | [0.054]    | [0.005]  | [0.005]  |
| Family Owned                                  | -0.714     | -1.663     | 0.151    | 0.110    |
|   | [5.292]    | [5.299]    | [0.330]  | [0.330]  |
| Only Winery                                   | -10.728**  | -11.313**  | 0.012    | -0.046   |
|   | [5.167]    | [5.225]    | [0.503]  | [0.507]  |
| Only Vineyard                                 | 1.262      | 0.382      | -0.242   | -0.359   |
|   | [6.934]    | [7.151]    | [0.518]  | [0.532]  |
| Managers' Environmental Attitudes             | 1.051***   | 0.963***   | -0.014   | -0.009   |
|   | [0.283]    | [0.284]    | [0.018]  | [0.018]  |
| Constant                                      | 69.174***  | 72.533***  | 8.041*** | 7.987*** |
|   | [11.697]   | [11.685]   | [0.845]  | [0.866]  |
| R-squared                                     | 0.341      | 0.357      | 0.108    | 0.128    |
| Adj.R-squared                                 | .304       | .319       | .052     | .070     |
| No of Obs                                     | 289        | 289        | 289      | 289      |
| F test  | 12.012***  | 13.981***  | 1.633*   | 1.953**  |

\* p<0.1, \*\* p<0.05, \*\*\* p<0.01

## RUNNING HEAD: SME MANAGERS' PERCEPTIONS OF COMPETITIVE PRESSURE & ADOPTION OF ENVIRONMENTAL PRACTICES

### Appendix A: Measurement items for environmental practices

**Environmental practice index** (alpha= 0.90), Adapted from Cassells and Lewis (2011)

*For the following practices, please rate the extent to which your company has adopted each (Likert scale 1 – 5; scale response anchors: 1=Not at all; 2=A little; 3=Moderately; 4=Significantly; 5=Very significantly)*

#### Measures and Items

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##### - **Operational Practices** (alpha = 0.90)

- A. Reduce fuel costs
- B. Implement changes in distribution to improve fuel efficiency
- C. Reduce polluting emissions to air and water
- D. Set measurable targets for reducing energy usage
- E. Prevent, treat, or capture sources of pollution
- F. Demonstrate a preference for green products in purchasing
- G. Track quality and quantity of water used and discharged in an effort to limit waste
- H. Change methods of transportation to reduce emissions
- I. Change machinery power to renewable or alternative energy sources
- J. Restore organic properties of contaminated soil
- K. Protect ecologically sensitive habitats

##### - **Waste Management Practices** (alpha = 0.82)

- A. Dispose of solid/hazardous/toxic wastes in an environmentally friendly way
- B. Introduce packaging from recycled materials, or biodegradable recyclable packaging
- C. Reduce product packaging to reduce waste
- D. Set measurable targets for waste reduction
- E. Take back packaging
- F. Take back end-of-life products
- G. Re-use, reclaim, and/or recycle used water
- H. Reduce solid waste by changing processing, filtration, ageing, bottling, packaging, and /or maintenance
- I. Train employees to improve solid waste management practices (such as recycling or re-use)
- J. Reduce or substitute materials based on the use of recycled materials

##### - **Environmentally-friendly practices** (alpha = 0.89)

- A. Incorporate principles of sustainability in business practices
- B. Modify product specifications to reduce wastes, emissions, or environmental impact
- C. Reduce energy use by changing building design, insulation, or equipment layout
- D. Adapt operations to satisfy widely acceptable certification standards for healthier product
- E. Implement new technology to reduce waste, emissions, or environmental impact
- F. Design products to be easy to repair and/or last longer
- G. Design products to be easy to disassemble and/or recycle
- H. Use non-hazardous materials
- I. Replace virgin materials with recycled materials

##### - **Environmental management practices** (alpha = 0.93)

- A. Have an environmental policy statement
  - B. Have staff with environmental management responsibilities
  - C. Engage in environmental audits
  - D. Have an environmental management system
  - E. Market the company based on claims related to the environment
  - F. Have an environmental purchasing policy
  - G. Evaluate the environmental performance of suppliers
  - H. Collect data related to environmental issues for measurement or to report on
  - I. Have an externally certified environmental management system
  - J. Engage in environmental/eco-labelling
-