



# AMERICAN ASSOCIATION OF WINE ECONOMISTS

AAWE WORKING PAPER

No. 217

*Business*

**DRIVERS OF GREEN INNOVATIONS:  
EVIDENCE FROM THE WINE INDUSTRY**

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June 2017

[www.wine-economics.org](http://www.wine-economics.org)

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EVIDENCE FROM THE WINE INDUSTRY**

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## **DRIVERS OF GREEN INNOVATIONS: EVIDENCE FROM THE WINE INDUSTRY**

**Abstract:** Little research has considered the potential influence of distant, external pressures on the implementation of firms' 'green' innovations, nor how internal firm resources might moderate this relationship. By combining institutional and resource-based theories and examining 649 firms in Australia, I find that export intensity is positively associated with green innovations. Further, as women in leadership roles increases in firms, the relationship strengthens between export intensity and green innovations. The results also suggest that greater levels of absorptive capacity among firms strengthens the relationship between export intensity and green innovations. Contributions of the findings are discussed along with limitations and future research opportunities.

**Keywords:** Absorptive capacity, dynamic capabilities, environmental sustainability, exports, gender, green innovation, innovation, sustainability

## **Introduction**

What drives ‘green’ innovations among firms? This has become an important question in the literature for, although firms are the vehicles for economic progress and growth (Henderson 2005), industrial activity can create negative externalities that damage the environment (Porter and van der Linde 1995), including air and water pollution, hazardous waste, and soil erosion (EPA, 2015). In fact, recent evidence demonstrates that in 2013 global carbon emissions resulting from industrial activity and changes in land use were 36 gigatonnes—61 percent higher than in 1990 (the Kyoto Protocol reference year) (CO<sub>2</sub>Now.org, 2015). Some reports go as far as to suggest that many Earth system processes (e.g., climate change, biodiversity) have reached or even surpassed their biophysical limits due to industrial activity (Rockstrom et al. 2009), and modern systems of production are claimed to be unsustainable (Grin et al. 2010).

Given such concerns, several studies have examined the drivers of green innovations to determine why firms might reduce their environmental impacts. These include the need to improve competitiveness (Bansal and Roth 2000), managers’ motivations, experiences, and interpretations of environmental issues (Schaltenbrand et al. 2016; Sharma 2000; Sharma et al. 1999; Walker et al. 2014), stakeholder pressure (Sharma and Henriques 2005), the impact of boards of directors (de Villiers et al. 2011; Dixon-Fowler et al. 2017; Kassinis et al. 2016; Post et al. 2011), institutional pressure (Berrone et al. 2010; Delmas 2002), functional department influences (Delmas and Toffel 2008), specialized organizational resources and capabilities (Chen and Chang 2013; Leonidou et al. 2015), legitimation (Bansal and Roth 2000), societal expectations (Lee et al. 2016), human resource benefits (Wagner 2013), executive compensation (Francoeur et al. 2017), and a sense of ecological responsibility (Bansal and Roth 2000). The growing interest in green innovations has helped to advance an understanding of the underlying drivers of firms’ engagement in environmental sustainability. Yet, following Leonidou et al. (2017), there remains work to be done.

One area that has received little attention is a firm's international orientation. The studies that explore institutional pressure and green innovations tend to examine this relationship in a local or national context (e.g., Berrone et al. 2010; Delmas 2002). However, following the logic of institutional theory (DiMaggio and Powell 1983), phenomenon such as internationalization and globalization (Clark and Mueller 1996; De Propris et al. 2008; Mayer and Whittington 1999) create environments where under certain circumstances firms operating within nation states could be expected to face external, or distant, pressures beyond their borders. Here, isomorphic effects may impact on firms to adapt to distant prevailing norms and practices in addition to those that are local or national.

Second, with few exceptions (e.g., Leonidou et al. 2017), little is known if there are contingent factors that moderate the relationship between a given driver and green innovations. For example, how leaders within firms influence strategy, shape culture, and expand and refine products and processes determines levels of strategic action, including actions related to green innovations (Kassinis et al. 2016; Post et al. 2011; Trianna et al. 2014). Therefore, who leads firms may have a level influence on the relationship between external pressures from export markets and green innovations. Further, the literature on innovation has long purported that innovation capacity is driven by certain resource endowments (Cohen and Levinthal 1990). Hence, while distant effects intensify pressures on some firms to innovate (e.g., innovate around environmentally sustainable practices), their ability to maximize such efforts may be contingent upon certain resource endowments—a proposition yet to be tested.

To address research gaps, this paper makes a few key contributions. First, this study examines the export intensity of firms. As the export efforts of firms increase, they are expected to encounter the expectations and demands of overseas markets to demonstrate environmental sustainability. Such a possibility follows the logic of institutional theory (DiMaggio and Powell

1983), and for what is believed to be the first time I test the relationship between the export intensity of firms and green innovations.

Second, researchers are increasingly interested in whether or not the gender of a firm's leaders is associated with green innovations. Some evidence suggests that women in leadership roles (e.g., board of director roles) are positively linked to green innovations (Kassinis et al. 2016; Post et al. 2011). In this study, *not* having women in leadership roles in a firm could hinder firms' green innovation efforts. Conversely, an increase of women in leadership roles in firms might increase the impact of export intensity on green innovations, which is something advanced in this study.

Third, scholars have argued that the ability to innovate is dependent upon certain resource endowments (Cohen and Levinthal 1990). One key resource endowment is absorptive capacity (Cohen and Levinthal 1990). Absorptive capacity denotes learning systems which facilitates firms' adaptation to the external environment. Given that knowledge on environmental sustainability acquired externally, including from overseas markets, is often tacit, complex, and new to the firm (Hart 1995; Russo and Fouts 1997), the ability to innovate requires the absorption and transformation of this new knowledge. In this sense, as firms export more and face external, international pressures to adopt environmentally sustainable practices, their ability to adopt these practices may be limited if their absorptive capacity is weak. This study contributes to the literature by examining the possibility that the strength of the relationship between the export intensity of firms and green innovations is moderated by those firms' absorptive capacity.

Lastly, this study contributes to practice by providing insights for firms planning on exporting for the first time and for firms wishing to increase their level of exports. This study provides some insights into how firms might strategize around exporting as a new activity, or how they might otherwise improve exports if they are already doing so. These insights include

identifying the influences that exporting might bring on operations, as well as the types of resources that might be required or developed to improve how firms treat the natural environment for exporting benefit.

### **Background and literature review**

#### Economic activity and environmental impacts

The economic activity of business can result in negative environment impacts, or so-called negative externalities (Porter and van der Linde 1995). These include, among other impacts, air and water pollution, hazardous waste, soil erosion, and even community disruption (EPA 2015). More specifically, business activity around the world produces more than 400 million tonnes of hazardous waste each year (The World Counts 2015), and a recent World Wildlife Fund (2012) report states that the human footprint is exceeding the Earth's biocapacity (the productive land and ocean areas available to produce renewable resources and absorb CO<sub>2</sub> emissions) by more than 50 percent. The same report suggests that humans now consume 50 percent more resources than the Earth can provide and, by 2030, even the carrying capacity of two planets is expected to fail our resource needs.

Among scholars, NGOs, economists, and other researchers who study such trends, the belief is growing that current modes of production are resulting in unsustainable environmental—if not economic—outcomes (Clark 2007; Stern 2007). Some suggest that many Earth system processes (e.g., climate change and biodiversity) have reached or even surpassed their biophysical limits due to human activities (Rockstrom et al. 2009). Grin et al. (2010) go so far as to claim that because modern systems of production are unsustainable, a substantial transition is required in order to resolve the situation.

## Theoretical perspectives

Concerns over the environmental impacts of business have led to a sense of urgency in the search for means and methods for their reduction (Loorbach and Wijsman 2013). Green innovation can be defined as an effort to reduce the impacts of business activity on the natural environment, in order to protect and preserve natural capital for current and future generations (Russo 2003; WCED 1987). The locus of attention tends to be the individual firm because these can create negative externalities, such as environmental degradation (Galdeano-Gómez et al. 2008). However, the drivers of green innovations can come from both outside and inside the firms.

First, institutional theory (DiMaggio and Powell 1983) posits that ‘external’ influences shape and drive organizational actions. Firms are thought to conform to social influences and therefore, to gain legitimacy, follow social expectations (Scott 2001). To gain this legitimacy, firms in turn adopt practices that are considered socially valuable within an organizational field. An organizational field is defined as sets of “organizations that, in the aggregate, constitute a recognized area of institutional life: key suppliers [or buyers], resource and product consumers, regulatory agencies, and other organizations that produce similar services or products” (DiMaggio and Powell 1983, p. 148). In this sense, analysis shifts from just competitors or networks of firms that formally interact to include the totality of relevant actors. In the context of this study, institutional pressure is believed to influence the adoption of green innovations (Berrone et al. 2010; Delmas 2002).

Second, critics of institutional theory suggest that firms are portrayed as passive pawns, adapting willingly to institutionalized expectations (Greenwood and Hinings 1996; Mayer and Whittington 1999; Oliver 1991). In their work, Greenwood and Hinings (1996) describe that institutional theory is not known for adequately explaining the ‘black box,’ or how internal dynamics and characteristics might affect the acceptance or rejection of institutionalized

practices. Others claim institutional theory does not adequately explain why differences appear to exist in the rate or levels at which firms fully adopt organizational practices, despite experiencing the same institutional pressures (Ashworth et al. 2009; Greenwood and Hinings 1996; Oliver 1991). Here, resource-based theories (e.g., Barney 1991; Teece et al. 1997) serve as a complement to what drives green innovations. Resource-based theories posit that firms gain advantages, efficiencies, effectiveness, superior performance, and innovativeness through resource endowments such as human resources, organizational assets, dynamic capabilities, and specialized routines. Thus, ‘internal’ factors are viewed as driving organizational practices such as environmental sustainability (Cheng and Chang 2012). In this study, I combine both institutional theory and resource-based perspectives to advance the literature.

## **Hypotheses**

### Export intensity

According to institutional theory, social pressures create an isomorphism that leads to imitation and the diffusion of organizational practices among firms (DiMaggio and Powell 1983). In the context of green innovations, studies relying on institutional theory have looked at organizational fields within the local or national arena (Berrone et al. 2010; Delmas 2002). However, the argument is also made that globalization has created the need to respond not only to local or national pressures, but, increasingly, to international pressures (Clark and Mueller 1996; De Propris et al. 2008; Mayer and Whittington 1999). Hence, the present study examines the institutional aspect of export intensity. To justify this direction, three key reasons can be identified as to why export intensity is expected to be linked to green innovations.

First, networks of trade connect sellers in a local or regional zone in one country with buyers in another country. This provides a channel for the transmission of coercive supply-chain pressures (Coe and Yeung 2001; Smith 2003). Porter (1990) explains this by suggesting that sophisticated and demanding buyers in a home market, acting through value chains, can

act as catalysts for the improvement of product quality, productivity, and competitiveness of domestic supplying firms. Additionally, however, influential international buyers can exercise coercive control over organizational behavior. Hughes (2000), for example, documents how floricultural suppliers from Kenya are required to meet strict requirements regarding production processes and quality set by major retailers in the United Kingdom. Similarly, wine exporters face considerable pressure, particularly from retailers in export markets such as the United Kingdom and the United States, to demonstrate environmentally sound business practices and production processes (Marshall et al. 2005; Marshall et al. 2010; Rigby et al. 2007; Strachan 2007; WFA 2007). Therefore, as firms intensify their exports, there is reason to believe that coercive pressure from international buyers could lead to the adoption of organizational practices that reduce environmental impacts (DiMaggio and Powell 1983).

Second, firms that operate in a local or national organizational field tend to conform to social pressures to gain legitimacy, which is expected to diffuse organizational practices (DiMaggio and Powell 1983). In contrast, firms that intensify their export efforts are likely to have more formal and informal interactions among organizational fields *outside* of the local or national context—for instance, organizations fields in foreign countries (cf. Bathelt 2005; Belussi and Sedita 2012; Chiarvesio et al. 2010). These interactions provide opportunities to learn about the technical performance or profitability of specific organizational innovations (Gertler 2001). As well, cross-border interactions are likely to drive mimetic-type behavior whereby firms imitate the practices of those they perceive as especially legitimate or successful, or where firms feel the pressure of international institutional expectations regarding their own practices back home (DiMaggio and Powell 1983). As their export orientation intensifies, and thus global best practice is more readily observed or international expectations more readily felt, firms are likely to experience a higher degree of mimetic pressure to adopt practices that reduce environmental impacts.

Third, the last twenty to thirty years have seen considerable international focus on climate change, global warming, deforestation, and other environmental concerns. Environmental impacts transcend local, regional, and national boundaries and can be regarded as world-wide in the sense that there is a global responsibility to respond (Grin et al. 2010). This global responsibility has perhaps been best highlighted by the Kyoto Protocol, ratified in 1990, and extending through to the recent (2015) climate talks in Paris. While there has been much debate among nations regarding carbon emission reduction targets, environmental awareness has also increased, especially regarding the actions needed to reduce environmental impacts (Pinske and Gasbarro 2016). Consequently, as a means to gain legitimacy, normative pressures are likely to influence the adoption of practices that reduce environmental impacts (DiMaggio and Powell 1983). Gaining legitimacy would be expected to be particularly important where a firm intensifies its exporting efforts. As export intensity increases, the normative pressures coming from the organizational field overseas and the cross-border expectations to reduce environmental impacts—in an effort to meet global values and moral commitments—are expected to be greater. Hence:

*Hypothesis 1: Export intensity is positively associated with the implementation of green innovations.*

#### Contingencies

While export intensity may subject firms to the influences and pressures of organizational fields in overseas markets, other factors need to be accounted for. More precisely, firm-specific strategies are constrained by, and dependent upon, a firm's resource endowments (Cyert and March 1963; Pfeffer and Salancik 1978). These resource endowments are expected to give the firm flexibility in choosing the best strategies in response to external requirements. Therefore, a firm's internal resources are likely to moderate the relationship between institutional, or external, influences and green innovations.

While there are many such internal resources to consider (Galbreath, 2005), the leaders of firms (a human capital resource) and absorptive capacity (a dynamic capability resource) are chosen for two reasons. First, the actions that firms take are influenced by the individuals who oversee, manage, and lead these firms (Hambrick and Mason, 1984). Of particular interest are the demographic characteristics of leaders (e.g., age, functional backgrounds, education, gender), as these characteristics are at least partially expected to explain why ‘firms do what they do’ (Hambrick and Mason, 1984). Second, there is strong support to suggest that for firms to increase their ability to innovate, they need well developed absorptive capacity (Maldonado et al. 2015). Hence, the view is that in the study of green innovations, absorptive capacity is an antecedent that requires consideration (Pinske et al. 2010). Combining the study of leadership and absorptive capacity has precedence (van Doorn et al., 2017), yet within the green innovations literature, they have received little empirical attention in the same study and therefore warrant investigation.

With respect to leadership, a good deal of research has focused on the characteristics, or resource ‘endowments,’ of firms’ top leaders (Hambrick 2007). Yet, some claim that firms are underutilizing individuals who could otherwise improve strategies and effectiveness (Katzenbach et al. 1995). Examples include women in leadership roles. With respect to the focal topic, women do appear to be attuned to and have influence over environmental issues (e.g., Diamantopoulos et al. 2003; Kassinis et al. 2016; Post et al. 2011). Accordingly, there are at least two key reasons why firms with women leadership would be expected to positively moderate the relationship between export intensity and green innovations.

First, women have been shown to demonstrate a higher concern for the natural environment than men (Diamantopoulos et al. 2003), while engaging more frequently in environmental behaviors (Davidson and Freudenburg 1996). Women’s environmental ‘conscience,’ therefore, is likely to be a significant factor with respect to export markets. As

women take up leadership roles, and come to influence firm strategy and direction, they would be expected to be well in touch with growing consumer interest in environmental sustainability, and aware of products that demonstrate environmental sensitivity (cf. Natividad 2005). Because women appear to be more conscious of firms' environmental responsibilities than men (Diamantopoulos et al. 2003), they would be expected to advocate on behalf of stakeholders to ensure that green innovations are implemented (cf. Russo and Earle 2010).

Second, differences between the beliefs and values of men and women have been identified. With respect to moral orientation, women have been shown to have a higher level of moral reasoning than men (Elm et al. 2001). Moral reasoning is a cognitive skill that individuals use in resolving moral dilemmas (Elm et al. 2001), including determining what is ethical and unethical. Women, perhaps by virtue of their higher levels of moral reasoning, appear to tolerate unethical practices less than men (Forte 2004; Wong and Wan 2011). Less tolerance for unethical practices could, in part, explain why women appear to be more sensitive to issues related to social responsibilities (e.g., environmental issues) (cf. Albaum and Peterson 2006), as such issues can have moral and/or ethical considerations (Carroll 1991). In this sense, as women in leadership roles are expected to have influence over firm strategies (Triana et al. 2014), if they see that the firms they help manage are engaging in environmental degradation, they would be expected to take corrective action. In fact, there is a view that women are more likely than men to take actions to reduce unethical behavior (Fukukawa et al. 2007; Oakley, 2000). Hence:

*Hypothesis 2: Women in leadership roles positively moderate the relationship between export intensity and the implementation of green innovations.*

The second contingent variable of interest is absorptive capacity. Absorptive capacity is a learning system which facilitates firms' adaptation to their external environment. Further, firms create organizational memories that are updated and leveraged as new knowledge is

absorbed. Absorptive capacity is thus a firm's ability to identify, value, and apply knowledge for commercial ends (Cohen and Levinthal 1990). This capacity enables firms to add new knowledge to their existing knowledge base, to create new knowledge from a novel combination of new and existing knowledge, and to use this knowledge to innovate, including in the area of green innovations.

With respect to export markets and green innovations, as firms increase their export intensity, not only are they expected to engage with overseas buyers, but also other external actors such regulatory authorities and government agencies, among others. As these interactions take place, new external knowledge is acquired (Roth, 1995). However, if firms lack well-developed absorptive capacity, they are unlikely to capitalize upon new knowledge in ways that lead to the implementation of green innovations. Therefore, high levels of absorptive capacity are expected to ensure the adequate understanding and application of external knowledge. Further, external knowledge about green innovations is often tacit, complex, and new to the firm, and implies potential changes in business processes (Hart 1995; Russo and Fouts 1997). To take advantage of this knowledge, firms need to be able to recognize the value of the external knowledge while transforming their learning to design or alter operations, processes, and products to reduce environmental impacts. Thus:

*Hypothesis 3: Absorptive capacity positively moderates the relationship between export intensity and the implementation of green innovations.*

## **Methods**

### Sample and data collection

To examine the posited hypotheses, the Australian wine industry is studied. The wine industry is well-suited for this particular study as the extent to which the industry address environmental issues is rapidly growing (e.g., Atkin et al. 2012; Rigby et al. 2007; WFA, 2007). Firms in four Australian wine regions are included: 1) New South Wales, 2) South Australia, 3) Victoria, and

4) Western Australia. These four wine regions comprise 99 percent of wine export sales volume in Australia, and therefore are well suited to this study. Figure 1 provides a graphical view of the wine regions in terms of their location within Australia (wine regions are shaded).

[insert Figure 1 here]

To collect data on the dependent variable, a survey was administered in the year 2012. Company and respondent names were drawn from the Winetitles database—Winetitles being a major publisher of wine-related materials, including the *Australia and New Zealand Wine Industry Directory* (<https://winetitles.com.au/wid/>). The Directory provides coverage of all wineries in Australia and is updated annually. Data include wineries' names, addresses, locations, and key personnel, as well as a host of fields covering details about operations and production. For this particular study, the CEO (or equivalent) was the targeted respondent for the survey.

[insert Figure 1 here]

For New South Wales, there are 475 wine companies; for South Australia, 680 wine companies; for Victoria, 754 wine companies; and for Western Australia, 387 wine companies. After an initial mailing and two follow-ups, 94 useable responses were received from New South Wales (20 percent response rate), 207 useable responses from South Australia (30 percent response rate), 241 useable responses from Victoria (32 percent response rate), and 107 useable responses from Western Australia (28 percent response rate). This equates to 649 useable surveys, keeping the response rates well in line with studies of the wine industry (Atkin et al. 2012). To test for response bias, responding firms were compared to non-responding firms on three key variables: green innovations, firm size, and firm age. Because no differences were found it can be concluded that non-response bias is unlikely to be a problem.

## Dependent variable

Edquist (1997) suggests that innovation encompasses new ideas as well as new combinations of existing elements, includes novelty of either a material or an intangible kind and refers to what is produced as well as to how goods and services are produced (i.e., processes). In the case of this study, there does not appear to be broad agreement about how to measure green innovations in the wine industry, nor is there a common scale. That being the case, and following the formative construct convention (Bollen and Lennox 1991), a literature review was undertaken to identify items that would serve as an index of actions related to green innovations. The list of actions was subjected to review and consultation with an academic with expertise in the fields of oenology and viticulture and who had several years' experience studying how wineries improve their environmental footprint. After this consultation, and cross-referencing the literature, an index of seven items was compiled (Appendix). The dependent variable is, therefore, a formative construct, consisting of seven actions.

To measure green innovations, respondents were asked to assess each action on a seven-point Likert scale, ranging from 1 = not applicable to 7 = implemented (see Appendix). To assess these formative indicators, regression analysis revealed that significant collinearity was not present between the actions in the green innovations index (highest VIF of 1.89). This provides *prima facie* evidence that formative indicators are suitable (Diamantopoulos and Winklhofer 2001), and the mean was taken.

## Independent and moderating variables

Firms that export are expected to interact with a variety of actors in organizational fields in overseas markets. As they interact, the expectation is that exporting firms confront the pressures of these overseas actors to conform to their social norms and expectations, in this instance about the positive treatment of the natural environment. To measure export intensity, a five-point Likert scale was created, where 1 = do not export, 2 = 1 to 25 percent exports, 3 =

26 to 50 percent exports, 4 = 51 to 75 percent exports, and 5 = 76 to 100 percent exports. Firms were assigned a number based on the percentage of their export sales. Data was sourced from the Winetitles database.

To measure women in leadership roles, this study identifies four different roles: 1) CEO, 2) marketing manager, 3) winemaker, and 4) viticulturist. The role of the board member was excluded, because many of the firms in this study are relatively small and private, which meant access to information on boards of directors was not available. CEO and marketing management roles relate directly to strategy, resource allocation decisions, goal- and objective-setting, product sales, marketing and promotion, and creation of an ethical culture. Winemakers are involved in all aspects of the technical side of wine-making including crushing and pressing grapes, fermentation, filtering, quality control, and new product development (e.g., new blends). Viticulturists oversee and manage the vineyard and the technicalities of grape growing, and increasingly rely on scientific techniques and technology to produce optimal grape quality. Given their scope of responsibilities, these four roles constitute roles of leadership within a wine firm. The study identified the gender for each of these four roles for each firm using the Winetitles database, where 1 = woman in the role, 0 otherwise. The maximum score for this variable is four.

#### Control variables

To account for the study's real effects, key control variables are used. Because firms that are larger may have more resources to invest in the implementation of green innovations (Atkin et al. 2012), firm size is measured by number of cases of wine produced annually, where 1 = up to 2,499 cases, 2 = 2,500 to 19,999 cases, 3 = 20,000 to 99,999 cases, 4 = 100,000 to 1,499,000 cases, and 5 = over 1,500,000 cases. Older firms may have had longer exposure to isomorphic processes related to green innovations (Slawinski and Bansal 2012), so firm age is controlled for by measuring number of years since founding. Because of skewed data, the logarithm of

age was taken. In the wine industry, firms operating in so-called ‘elite’ sub-regions within a given region may have more incentive or motivation to be on the leading edge of innovation (Costley 2012; Cross et al. 2011; Schmitt 2013), and this may include green innovations. Therefore, elite sub-regions are identified, these being Barossa Valley (South Australia), Hunter Valley (New South Wales), Margaret River (Western Australia), and Port Philip (Victoria). Elite sub-regions were determined by reference to Australia’s leading wine writer and critic, James Halliday, who annually publishes the *Australian Wine Companion* (e.g., Halliday 2014). To determine elite status, Halliday uses a points system, in which wines rated 94 or higher are considered outstanding or elite. The proportion of wines rated 94 or higher for firms in each sub-region was examined to determine elite status. For this variable, firms in the elite sub-region were coded 1, 0 otherwise. To further account for any differences between the wine regions, dummy variables were included for each one. Finally, regarding control factors, firm age was taken from company websites, and, where appropriate, other control variables were taken from the Winetitles database.

[insert Table 1 here]

## **Results**

Means, standard deviations, and correlations are presented in Table 1. Although there are significant correlations between some of the control and predictor variables, the correlations are below 0.80. Correlations below 0.80 minimizes concerns over multicollinearity (O’Brien 2007). Further, the highest variation inflation factor (VIF) of 5.594 and the lowest tolerance value of .252 are considered to be within acceptable standards (O’Brien 2007), providing further evidence that multicollinearity is unlikely to be problematic.

[insert Table 2 here]

Table 2 presents the results of the moderated hierarchical regression analysis. Prior to analysis, interaction variables were centred. In Step 1, the control variables were entered; in

Step 2, the independent variables were added; and in Step 3, the interaction variables were added. Significant interaction indicates a moderating effect (Baron and Kenny 1986). Hypothesis 1 posits that export intensity is positively associated with the implementation of green innovations. As shown in Model 2, there is support for this hypothesis, as export intensity is significant and positive with the dependent variable ( $\beta = 0.29$ ;  $p < 0.001$ ).

Hypothesis 2 posits that the relationship between the export intensity of firms and the implementation of green innovations will be positively moderated by women in leadership roles. Model 3 suggests that there is support for this hypothesis, as the interaction term is positively and significant ( $\beta = 0.49$ ;  $p < 0.001$ ). To help interpret this finding, the interaction term is plotted in Figure 2. As shown, the positive effect of export intensity is more likely to be observed when there are higher levels of women in leadership roles in the firm.

[insert Figure 2 here]

Lastly, Hypothesis 3 states that the relationship between export intensity and the implementation of green innovations is positively moderated by absorptive capacity. Model 3 suggests that there is support for this hypothesis, as the interaction term is positive and significant ( $\beta = 0.35$ ;  $p < 0.001$ ). The interaction term is plotted in Figure 3. As shown, the positive effect of export intensity is more likely to be observed when there are higher levels of absorptive capacity in the firm.

[insert Figure 3 here]

#### Robustness tests

To ensure the validity of the results, I used an alternative measure of export intensity. Previous studies have used the number of countries as a proxy for a firm's international orientation (e.g., Bansal, 2005; Sanders and Carpenter, 1998). The number of countries is thought to represent the extent to which a firm is active overseas, and therefore the extent to which the firm is exposed to international markets. Relying on the Winetitles database, the number of countries

each firm exports to was extracted and that value entered for analysis (in the case of no countries, 0 was used). After eliminating outliers, the mean number of countries is 6.18 (S.D. 2.35). Accounting for the number of countries as an alternative measure of export intensity, the results remain substantively unchanged, therefore corroborating the main findings. I also account for reverse causality. That is, there is the possibility that firms that implement green innovations are more likely to export. Following Wu (2008), a Hausman test was conducted using an instrumental variable technique, a single-equation  $F$ -test. The test statistic between green innovations and export intensity was insignificant ( $F = 0.884$  with  $p = 0.347$ ). Evidence for a two-way link is not apparent, thereby reducing concerns over reverse causality.

## **Discussion**

This study analyses the influence of firms' export intensity on the implementation rates of green innovations. The paper also explores two contingencies: 1) the influence of women in leadership roles in firms on the link between export intensity and green innovations and 2) the influence of absorptive capacity on the link between export intensity and green innovations. The research contributes to prior literature by focusing on new features and relationships that lead to the diffusion of organizational practices; namely, green innovations. Therefore, a few key contributions are made.

First, some studies have explored green innovations under the rubric of institutional theory. For example, Delmas (2002) finds that there are differences between countries in the adoption rates of environmental management systems. She attributes her findings to differences in institutional environments at the national level. In their study, Berrone et al. (2010) find that under institutional pressure at both national and local levels, family-controlled firms have better environmental performance than non-family-controlled firms. In contrast, a notable characteristic of the present study is that exposure to external environments, such as export markets, may also open up firms to new, if not heightened, pressures. My findings do suggest

a link between export intensity and the implementation rates of green innovations. As firms interact with organizational fields overseas, global markets can expose them to new pressures such as expectations about organizational practices and processes. As these pressures bear upon firms, isomorphic processes are expected to be amplified such that firms are likely to seek to conform to the expectations; this, in turn, could create diffusion effects with respect to organizational practice and process adaptation. Hence, pressures to conform to social expectations in an organizational field might not be limited to local or national environments, but rather may include international environments as well.

Second, resource-based theorists argue that the ability of a firm to innovate is driven by ‘internal’ rather than ‘external’ factors. Innovation capacity is viewed as being driven by the resource-endowments of firms. While there are many such possible resources, some studies suggest that specialized human capital, namely women in leadership roles, make a difference with respect to the innovation capacity of firms (Miller and Triana, 2009; Torchia et al. 2011). Such findings are significant as women tend to be substantially underrepresented in top leadership roles. Further, as top leaders have the authority to shape strategy and the actions that firms take (Hambrick, 2007; Hambrick and Mason, 1984; Triana et al. 2014), who leads and how has become an important research topic. This study suggests that while firms’ export intensity may be positively linked to green innovations, who is positioned in leadership roles in these firms should be accounted for. Women in top roles are likely to lead in ways that take account for negative externalities, such as those that are environmental in nature. Because women appear to demonstrate greater sensitivity to environmental issues than men (Diamantopoulos et al. 2003; Kassinis et al. 2016; Post et al. 2011), as they reach leadership roles and are positioned to have greater influence over strategy, they are likely to work to ensure that green innovations are implemented. Where they identify deficiencies in a firm’s environmental approach, they are also more likely than men to take corrective action (cf.

Fukukawa et al. 2007). Hence, this study bridges institutional and resource-based theories suggesting that the two are not mutually exclusive, and that internal factors and external influences could interact to improve green innovations.

Third, most studies in the green innovations stream do not account for absorptive capacity as a resource-endowment. This is surprising given that there is a general view that absorptive capacity underpins innovation efforts (Cohen and Levinthal, 1990; Maldonado et al. 2015; Zahra and George, 2002). Absorptive capacity is believed to facilitate the ability of firms to innovate through valuing and applying new, external knowledge. Zahra and George (2002) go as far as to argue that absorptive capacity is not only critical to innovation capacity, but to competitive advantage as well. In this study, as firms intensify their export activity, they likely interact with actors in an organizational field outside the home country. Such actors could include overseas buyers, sales agents, government agencies and so on. Each one of these actors in the organizational field are expected to place pressure on home firms to conform to their social expectations (DiMaggio and Powell 1983). However, as actors interact, new knowledge is expected to be created. For firms to take advantage of this new knowledge, they need to be able to see its value and transform it to commercial ends. If they do not have the necessary learning systems in place to do this, their ability to innovate is restricted. This study finds that as firms demonstrate greater levels of absorptive capacity, the relationship between export intensity and green innovations is strengthened. The finding offers some level of support that certain internal resource-endowments may positively moderate any potential new knowledge generated through interactions with actors in an overseas organizational field to drive green innovations. The contribution therefore extends research on green innovations, where the need to consider how organizational fields, in an institutional sense, and firm's internal capacity to innovate, could complement each other.

Lastly, there are practical contributions. As domestic markets mature or become tapped, many firms seek new overseas opportunities to improve their competitive position. Alternatively, some firms seek to export regardless of domestic market conditions. This study suggests that implementing green innovations could signal to export markets that a firm is willing to conform to the expectations and social conventions of those markets, perhaps providing a gateway to secure new markets. Second, women continue to be underrepresented in top leadership roles (e.g., Catalyst 2014; HRReview 2013; Marcus Evans 2013; WGEA 2012). This study suggests that increasing women in top leadership roles could be beneficial, particularly with respect to green innovations, an area seen as important to firm strategy (Glass et al. 2015). Lastly, the ability to adapt to external environments is critical to firm success (Cohen and Levinthal, 1990). This study suggests that taking advantage of any new knowledge gained from interacting with export markets likely requires the development of learning systems that can absorb and transform this new knowledge for commercial ends, such as green innovations.

### **Limitations and future research**

This study is not without limitations. First, only firms in one industry in Australia are examined. Relying on firms in one industry and one country does limit the generalizability of the results. Future research could explore different types of industries and different countries. Second, this study examined women in a variety of roles but did not include women at the board of director level. Previous research suggests that women residing on boards of directors do appear to influence green innovations (Kassinis et al. 2016; Post et al. 2011). Future studies could include women at this level, as well as investigate the complementarities of women in different types of leadership roles. Third, only green innovations were examined. Future research could explore alternative measures, such as new product development, financial performance, or a broader measure of corporate social responsibility (CSR). As international growth and

expansion can be key to many firms' survival, additional work on alternative dependent variables is warranted.

In conclusion, this study sought to extend insights into the drivers of green innovations. The findings suggest that as firms intensify their exports, they tend to implement green innovations at a greater rate too. However, both women in leadership roles and absorptive capacity positively moderate the relationship between export intensity and green innovations. The findings suggest that studies of green innovations consider both new predictive variables, as well as potential moderating influences on any direct relationships.

## Appendix

### *Green innovations<sup>a</sup>*

1. Alternative energy sources (e.g., green electric power, solar, wind) in the overall production of wine.
2. Alternative packaging to bottle wine (e.g., lightweight glass bottles, plastic PET bottles, recycled bottles).
3. Reduction of refrigeration loads (e.g., night-time air cooling, timing of loads).
4. Energy efficient technology in buildings (e.g., variable speed devices, computer-controlled lighting; use of thermal efficient materials).
5. Minimization of agrichemicals (e.g., through use of petiole analysis, optical weed spray controllers).
6. Alternative fuel (e.g., biodiesel, ethanol) to power tractors, utility vehicles, machinery, etc.
7. Carbon sinks/sequestering (e.g., reduced tillage, use of compost, planting of new shrubs, hedgerows, or trees).

<sup>a</sup>. 7-point scale were 1 = not applicable, 2 = not considering, 3 = future consideration, 4 = assessing suitability, 5 = planning to implement, 6 = implementing now, and 7 = implemented.

## References

- Albaum, G., & Peterson, R. A. (2006). Ethical attitudes of future business leaders: Do they vary by gender and religiosity? *Business & Society, 45*, 300-321.
- Ashworth, R., Boyne, G., & Delbridge, R. (2009). Escape from the iron cage? Organizational change and isomorphic pressures in the public sector. *Journal of Public Administration Research and Theory, 19*, 165-187.
- Atkin, T., Gilinsky, A., Jr., & Newton, S.K. (2012) Environmental strategy: Does it lead to competitive advantage in the US wine industry? *International Journal of Wine Business Research, 24*, 115-133.
- Bansal, P. (2005). Evolving sustainability: A longitudinal study of corporate sustainable development. *Strategic Management Journal, 26*, 197-218.
- Bansal, P., & Roth, K. (2000). Why companies go green: A model of ecological responsiveness. *Academy of Management Journal, 43*, 717-736.
- Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management, 17*, 99-120.
- Baron, R.M., & Kenny, D.A. (1986). The moderator-mediator distinction in social psychology: Conceptual, strategic and statistical considerations. *Journal of Personality and Social Psychology, 51*, 1171-1182.
- Bathelt, H. (2005). Cluster relations in the media industry: Exploring the ‘distanced neighbor’ paradox in Leipzig. *Regional Studies, 39*, 105-127.
- Belussi, F., & Sedita, S. (2012) Industrial districts as open learning systems: Combining emergent and deliberate knowledge structures. *Regional Studies, 46*, 165-184.
- Berrone, P., Cruz, C., Gomez-Mejia, L., & Larrazza-Kintana, M. (2010). Socioemotional wealth and corporate responses to institutional pressures: Do family-controlled firms pollute less? *Administrative Science Quarterly, 55*, 82-113.

- Bollen, K., & Lennox, R. (1991). Conventional wisdom on measurement: A structural equation perspective. *Psychological Bulletin*, 110, 305-314.
- Carroll, A.B. (1991). The pyramid of corporate social responsibility: Toward the moral management of organizational stakeholders. *Business Horizons*, 34, 39-48.
- Catalyst. (2014). Women CEOs of the Fortune 500, available at <http://www.catalyst.org/knowledge/women-ceos-fortune-1000> (accessed January 6, 2016).
- Chen, Y.-S., & Chang, C.-H. (2013). The determinants of green produce development performance: Green dynamic capabilities, green transformational leadership, and green creativity. *Journal of Business Ethics*, 116, 107-119.
- Chiarvesio, M., Di Maria, E., & Micelli, S. (2010). Global value chains and open networks: The case of Italian industrial districts. *European Planning Studies*, 18, 333-350.
- Clark, G. (2007) Evolution of the global sustainable consumption and production policy and the United Nations Environment Programme's (UNEP) supporting activities. *Journal of Cleaner Production*, 15, 492-498.
- Clark, P., & Mueller, F. (1996) Organizations and nations: from universalism to institutionalism? *British Journal of Management*, 7, 125-139.
- Coe, N.M., & Yeung, H.W-C. (2001). Geographical perspectives: An introduction to the JEG special issue 'Mapping globalisation: geographical perspectives on international trade and investment.' *Journal of Economic Geography*, 1, 367-380.
- Cohen, W.M., & Levinthal, D.A. (1990). Absorptive capacity: A new perspective on learning and innovation. *Administrative Science Quarterly*, 35, 128-152.
- CO<sub>2</sub>Now.org. (2015). Global carbon emissions, available at: <http://co2now.org/Current-CO2/CO2-Now/global-carbon-emissions.html> (accessed November 26, 2015).
- Costley, D. (2012). Wine regions to dig deep to promote unique identity. *Australian and New Zealand Grapegrower and Winemaker*, 579, 67-68.

- Cross, R., Plantinga, A.J., & Stavin, R.N. (2011). The value of terroir: Hedonic estimation of vineyard sale prices, *Journal of Wine Economics*, 6, 1-14.
- Cyert, R., & March, J. (1963). *A behavioral theory of the firm*. Englewood Cliffs, NJ: Prentice-Hall.
- Davidson, D.J., & Freudenburg, W.R. (1996) Gender and environmental risk concerns: A review and analysis of available research. *Environment and Behavior*, 28, 302-339.
- Delmas, M.A. (2002). The diffusion of environmental management standards in Europe and in the United States: An institutional perspective. *Policy Sciences*, 35, 91-119.
- Delmas, M.A., & Toffel, M.W. (2008). Organizational responses to environmental demands: Opening the black box. *Strategic Management Journal*, 29, 1027-1055.
- De Propris, L., Menghinello, S., & Sugden, R. (2008). The internationalization of production systems: Embeddedness, openness and governance. *Entrepreneurship and Regional Development*, 20, 493-515.
- de Villiers, C., Naiker, V., & van Staden, C.J. (2011). The effect of board characteristics on firm environmental performance. *Journal of Management*, 37, 1636-1663.
- Diamantopoulos A., Schlegelmilch B.B., Sinkovics R.R., & Bohlen, G.M. (2003). Can socio-demographics still play a role in profiling green consumers? A review of the evidence and an empirical investigation. *Journal of Business Research*, 56, 465-480.
- Diamantopoulos A., & Winklhofer, H.M. (2001). Index construction with formative indicators: An alternative to scale development. *Journal of Marketing Research*, 38, 269-277.
- DiMaggio, P.J., & Powell, W.W. (1983). The iron cage revisited: Institutional isomorphism and collective rationality in organization fields. *American Sociological Review*, 48, 147-160.

- Dixon-Fowler, H.R., Ellstrand, A.E., & Johnson, J.L. (2017). The role of board environmental committees in corporate environmental performance. *Journal of Business Ethics*, *140*, 423-438.
- Edquist, C. (1997). Introduction, in Edquist C. (Ed), *Systems of Innovation: Technologies, Institutions and Organisations*. Pinter, London.
- Elm, D.R., Kennedy, E.J., & Lawton, L. (2001). Determinants of moral reasoning: Sex role orientation, gender, and academic factors. *Business & Society*, *40*, 241-265.
- EPA (2015) Learn the issues, available at: <http://www2.epa.gov/learn-issues> (accessed November 26, 2015).
- Forte, A. (2004). Antecedents of managers' moral reasoning. *Journal of Business Ethics*, *51*, 315-347.
- Francoeur, C., Melis, A., Gaia, S., & Aresu, S. (2017). Green or greed? An alternative look at CEO compensation and corporate environmental commitment. *Journal of Business Ethics*, *140*, 439-453.
- Fukukawa, K., Shafer, W. E., & Lee, G. M. (2007). Values and attitudes toward social and environmental accountability: A study of MBA students. *Journal of Business Ethics*, *71*, 381-394.
- Galbreath, J. (2005). Which resources matter to firm success? An exploratory study of resource-based theory. *Technovation*, *25*, 979-987.
- Galdeano-Gómez, E., Cépedes-Lorente, J., & Martínez-del-Río, J. (2008). Environmental performance and spillover effects on productivity: Evidence from horticultural firms. *Journal of Environmental Management*, *88*, 1552-1561.
- Gertler, M.S. (2001). Best practice? Geography, learning and the institutional limits to strong convergence. *Journal of Economic Geography*, *1*, 5-26.

- Glass, C., Cook, A., & Ingersoll, A.R. (2015). Do women leaders promote sustainability? Analyzing the effects of corporate governance composition on environmental performance. *Business Strategy and the Environment*, in press.
- Greenwood, R., & Hinings, C.R. (1996). Understanding radical organizational change: Bringing together the old and new institutionalism. *Academy of Management Review*, *21*, 1022-1054.
- Grin, J., Rotmans, J., & Schot, J. (2010). *Transitions to sustainable development: New directions in the study of long term transformative change*. Routledge: New York.
- Halliday, J. (2014). *Australian wine companion*. Richmond, VIC: Hardie Grant Books.
- Hambrick, D.C. (2007). Upper echelons theory: An update. *Academy of Management Review*, *32*, 334-343.
- Hambrick, D.C., & Mason, P.A. (1984). Upper echelons: The organization as a reflection of its top managers. *Academy of Management Review*, *9*, 193-206.
- Hart, S.L. (1995). A natural-resource-based view of the firm. *Academy of Management Review*, *20*, 986-1014.
- Henderson, D. (2005) The role of business in the world of today. *Journal of Corporate Citizenship*, *17*, 30-32.
- HRReview. (2013). Just 3% of FTSE350 companies have female CEO's now, available at <http://www.hrreview.co.uk/hr-news/diversity-equality/just-3-of-companies-have-female-ceos-now/49078> (accessed January 6, 2014).
- Katzenbach, J.R., Beckett, F., Dichter, S., Feigen, M., Gagnon, C., Hope, Q., & Ling, T. (1995). *Real change leaders*. New York: Random House.
- Lee, J.W., Kim, Y.M., & Kim, Y.E. (2016). Antecedents of adopting corporate environmental responsibility and green practices. *Journal of Business Ethics*, in press.

- Leonidou, L., Christodoulides, P., Kyrgidou, L.P., & Palihawadana, D. (2017). Internal drivers and performance consequences of small firm green business strategy: The moderating role of external forces. *Journal of Business Ethics*, *140*, 585-606.
- Loorbach, D., & Wijsman, K. (2013). Business transition management: Exploring a new role for business in sustainability transitions. *Journal of Cleaner Production*, *45*, 20-28.
- Maldonado, T., Vera, D.M., & Keller, R.T. (2015). Reconsidering absorptive capacity: A meta-analysis to improve theoretical foundations and measures. Academy of Management Best Paper Proceedings, Annual Academy of Management Conference, Vancouver.
- Marcus Evans. (2013). 'Abysmal' that no female CEO among Germany's DAX 30 companies, available at <http://www.marcusevans.com/reviews/news.asp?newsID=202> (accessed January 6, 2016).
- Marshall, R.C., Akoorie, M.E.M., Hamann, R., & Sinha, P. (2010) Environmental practices in the wine industry: An empirical application of the theory of reasoned action and stakeholder theory in the United States and New Zealand. *Journal of World Business*, *45*, 405-414.
- Marshall, R.C., Cordano, M., & Silverman, M. (2005). Exploring individual and institutional drivers of proactive environmentalism in the US Wine Industry. *Business Strategy and the Environment*, *14*, 92-109.
- Mayer, M.C.J., & Whittington, R. (1999) Strategy, structure, and systemness: National institutions and corporate change in France, Germany, and the UK, 1950-1993. *Organization Studies*, *20*, 933-959.
- Miller, T., & Triana, M. del C. (2009). Demographic diversity in the boardroom: Mediators of the board diversity–firm performance relationship. *Journal of Management Studies*, *46*, 755-786.
- Natividad, I. (2005) Women directors and the global company. *Directors Monthly*, *March*, 13-

- Oakley, J.G. (2000). Gender-based barriers to senior management positions: Understanding the scarcity of female CEOs. *Journal of Business Ethics*, 27, 321-334.
- O'Brien, R.M. (2007). A caution regarding rules of thumb for variance inflation factors. *Quality and Quantity*, 41, 673-690.
- Oliver, C. (1991). Strategic responses to institutional processes. *Academy of Management Journal*, 16, 145-179.
- Patel, P.C., Kohtamäki, M., Parida, V., & Wincent, J. (2015). Entrepreneurial orientation-as-experimentation and firm performance: The enabling role of absorptive capacity. *Strategic Management Journal*, 36, 1739-1749.
- Pfeffer, J., & Salancik, G. (1978). *The external control of organizations: A resource dependence perspective*. New York: Harper and Row.
- Pinkse, J., & Gasbarro, F. (2016). Managing physical impacts of climate change: An attentional perspective on corporate adaptation. *Business & Society*, in press.
- Pinske, J., Kuss, M.J., & Hoffmann, V.H. (2010). On the implementation of a 'global' environmental strategy: The role of absorptive capacity. *International Business Review*, 19, 160-177.
- Porter M.E. (1990) *The competitive advantage of nations*. The Free Press, New York.
- Porter, M.E., & van der Linde, C. (1995). Toward a new conception of the environment-competitiveness relationship. *The Journal of Economic Perspectives*, 9, 97-118.
- Post, C., Rahman, N., & Rubow, E. (2011). Green governance: Boards of directors' composition and environmental corporate social responsibility. *Business & Society*, 50, 189-223.
- Rigby E., Harvey, F., & Birchall, J. (2007). Tesco to put 'carbon rating' on labels, available at <http://www.ft.com/cms/s/0/133d5be4-a718-11db-83e4-0000779e2340.html> (accessed on December 4, 2016).

- Rockstrom, J., Steffen, W., Noone, K., Persson, A., Chapin, F.S., Lambin, E.F., Lenton, T.M., Scheffer, M., Folke, C., Schellnhuber, H.J., Nykvist, B., de Wit, C.A., Hughe, T., van der Leeuw, S., Rodhe, H., Sorlin, S., Snyder, P.K., Costanza, R., Svedin, U., Falkenmark, M., Karlberg, L., Corell, R.W., Fabry, V.J., Hansen, J., Walker, B., Liverman, D., Richardson, K., Crutzen, P., & Foley J.A. (2009). A safe operating space for humanity. *Nature*, *461*, 472-475.
- Roth, K. (1995). Managing international interdependence: CEO characteristics in a resource-based framework. *Academy of Management Journal*, *38*, 200-231.
- Russo, M.V. (2003). The emergence of sustainable industries: Building on natural capital. *Strategic Management Journal*, *24*, 317-331.
- Russo, M.V., & Earle, A.G. (2010). *The geography of sustainable enterprise and the concentration of mission-driven companies*. Eugene, OR: University of Oregon.
- Russo, M.V., & Fouts, P.A. (1997). A resource-based perspective on corporate environmental performance and profitability. *Academy of Management Journal*, *40*, 534-559.
- Sanders, W.G., & Carpenter, M.A. (1998). Internationalization and firm governance: The roles of CEO compensation, top team composition, and board structure. *Academy of Management Journal*, *41*, 158-178.
- Schmitt, P. (2013). Aussie wine trends: 7 Sub-regional recognition, available at: [www.thedrinksbusiness.com/2013/01/aussie-wine-trends-7-sub-regional-recognition](http://www.thedrinksbusiness.com/2013/01/aussie-wine-trends-7-sub-regional-recognition) (accessed June 27, 2016).
- Scott, R.W. (2001). *Institutions and organizations*. Thousand Oaks, CA: Sage.
- Sharma, S. (2000). Managerial interpretations and organizational context as predictors of corporate choice of environmental strategy. *Academy of Management Journal*, *43*, 681-697.
- Sharma, S., & Henriques, I. (2005). Stakeholder influences on sustainability practices in the Canadian forest products industry. *Strategic Management Journal*, *26*, 159-180.

- Sharma, S., Pablo, A.L., & Vredenburg, H. (1999). Corporate environmental responsiveness strategies: The importance of issue interpretation and organizational context. *Journal of Applied Behavioral Science, 35*, 87-108.
- Slawinski, N., & Bansal, P. (2015). Short on time: Intertemporal tensions in business sustainability. *Organization Science, 26*, 531-549.
- Smith, A. (2003). Power relations, industrial clusters, and regional transformations: Pan-European integration and outward processing in the Slovak clothing industry. *Economic Geography, 79*, 17-40.
- Stern, N. (2007). *The economics of climate change*. Cambridge: Cambridge University Press.
- Strachan, S. (2007). *A statement of policy and programs to deliver greater sustainability for the Australian wine sector*. Adelaide: Winemakers' Federation of Australia.
- Teece, D.J. (1986). Profiting from technological innovation: Implications for integration, collaboration, licensing, and public policy. *Research Policy, 15*, 295-305.
- Teece, D.J., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic Management Journal, 18*, 509-533.
- Torchia, M., Calabrò, A., & Huse, M. (2011). Women directors on corporate boards: From tokenism to critical mass. *Journal of Business Ethics, 102*, 299-317.
- Triana, M.C., Miller, T.L., & Trzebiatowski, T.M. (2014). The double-edged nature of board gender diversity: Diversity, firm performance, and the power of women directors as predictors of strategic change. *Organization Science, 25*, 609-632.
- The World Counts (2015) Hazardous waste statistics, available at [http://www.theworldcounts.com/counters/waste\\_pollution\\_facts/hazardous\\_waste\\_statistics](http://www.theworldcounts.com/counters/waste_pollution_facts/hazardous_waste_statistics) (accessed on August 26, 2016).

- van Doorn, S., Heyden, M.L.M., & Volberda, H.W. (2017). Enhancing entrepreneurial orientation in dynamic environments: The interplay between top management team advice-seeking and absorptive capacity. *Long Range Planning, 50*, 134-144.
- Wagner, M. (2013). 'Green' human resource benefits: Do they matter as determinants of environmental management system implementation? *Journal of Business Ethics, 114*, 443-456.
- Walker, K., Ni, N., & Huo, W. (2014). In the Red Dragon green? An examination of the antecedents and consequences of environmental proactivity in China. *Journal of Business Ethics, 125*, 27-43.
- WCED. (1987). *Our common future*. Oxford: Oxford University Press.
- WFA. (2007). *Trends in environmental assurance in key Australian wine export markets*. Adelaide: Winemakers' Federation of Australia.
- WGEA. (2012). *Australian census of women in leadership*. Canberra: Commonwealth of Australia.
- Wenpin, T. (2001). Knowledge transfer in intraorganizational networks: Effects of network position and absorptive capacity on business unit innovation and performance. *Academy of Management Journal, 44*, 996-1004.
- Wong, T.K., & Wan, P. (2011). Perceptions and determinants of environmental concern: The case of Hong Kong and its implications for sustainable development. *Sustainable Development, 19*, 235-249.
- World Wildlife Fund. (2012). Living planet report 2012: Biodiversity, biocapacity and better choices, available at [http://awsassets.wwf.org.au/downloads/mc078\\_g\\_living\\_planet\\_report\\_2012\\_15may12.pdf](http://awsassets.wwf.org.au/downloads/mc078_g_living_planet_report_2012_15may12.pdf) (accessed June 10, 2016).

- Wu, W-P. (2008). Dimensions of social capital and firm competitiveness improvement: The mediating role of information sharing. *Journal of Management Studies*, 45, 122-146.
- Zahra, S.A., & George, G. (2002). Absorptive capacity: A review, reconceptualization, and extension. *Academy of Management Review*, 27, 185-203.

## Tables

Table 1. Descriptives

Variable	Mean	S.D.	1	2	3	4	5	6	7
1. Green innovations	4.21	1.39	1.00						
2. Firm size	1.80	0.90	0.24**	1.00					
3. Firm age (log)	1.28	0.33	0.10*	.36**	1.00				
4. Elite sub-region status	0.39	0.49	-0.01	0.05	-0.00	1.00			
5. Export intensity	2.12	1.01	0.11*	0.54**	0.14**	0.05	1.00		
6. Women in leadership roles	0.84	0.85	0.31**	-0.33**	-0.09	-0.05	0.20**	1.00	
7. Absorptive capacity	4.92	0.96	0.30**	0.14**	0.06	-0.02	-0.02	0.01	1.00

\*  $p = 0.05$ ; \*\*  $p = 0.01$

Table 2. Results

Variables	Model 1	Model 2	Model 3
	Control variables	Direct effects	Interaction effects
	$\beta$	$\beta$	$\beta$
Firm size	0.21**	0.16*	0.17**
Firms age (log)	0.05	0.00	-0.00
Elite sub-region status	0.03	-0.07	-0.10
Wine region dummies	included	included	included
Export intensity		0.29***	0.30***
Women in leadership roles		0.04	0.32***
Absorptive capacity		.028***	0.03
Export intensity x women in leadership roles			0.49***
Export intensity x absorptive capacity			0.35***
<i>R</i>	0.24	0.36	0.39
<i>R</i> <sup>2</sup>	0.05	0.13	0.15
<i>F</i>	5.78***	10.53***	10.85***
$\Delta R^2$		0.08***	0.02**

*n* = 649

\* *p* < 0.05

\*\* *p* < 0.01

\*\*\* *p* < 0.001

Note: wine region dummies are not significant

## Figures

Figure 1. Sample locales (wine regions included are colored)

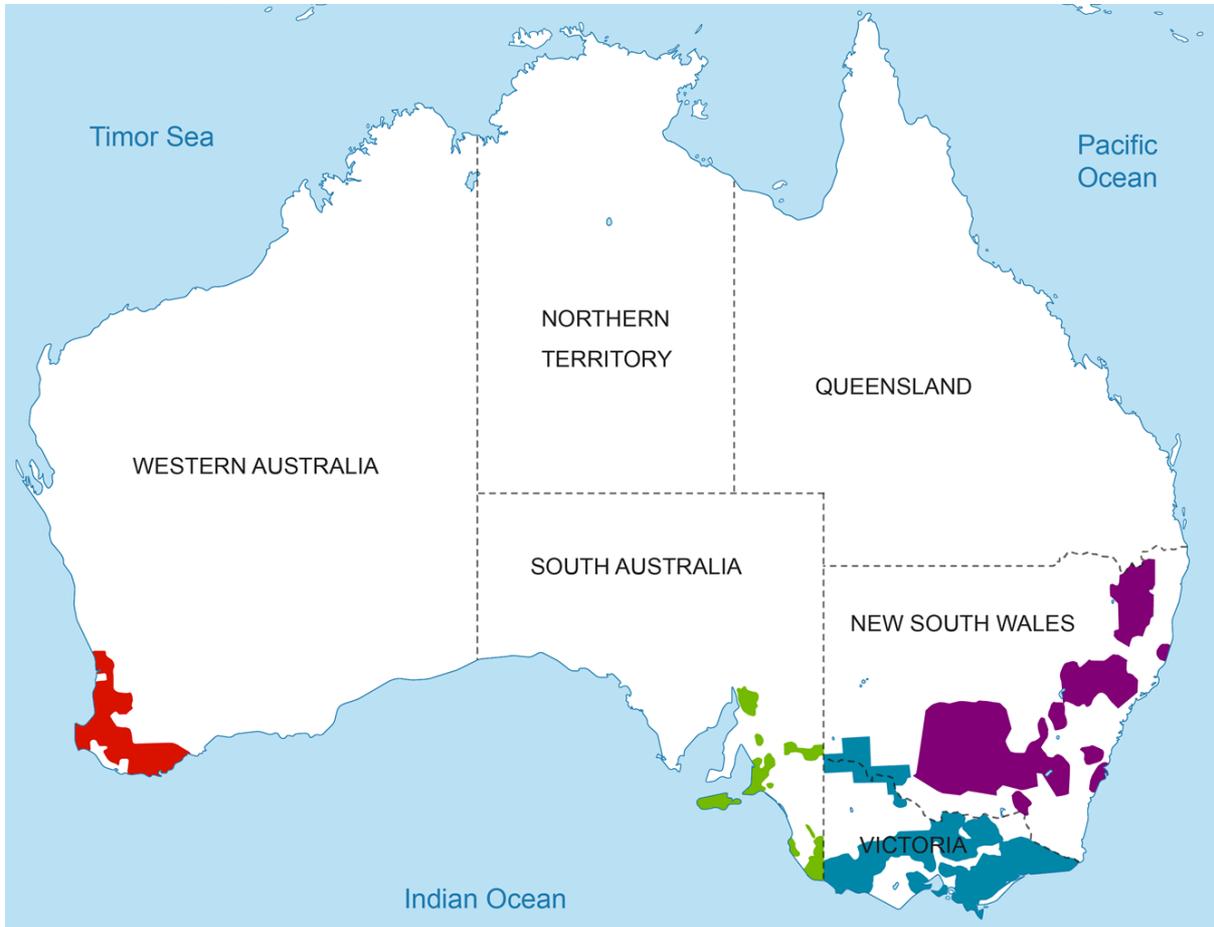


Figure 1. Plot analysis: Women in leadership roles

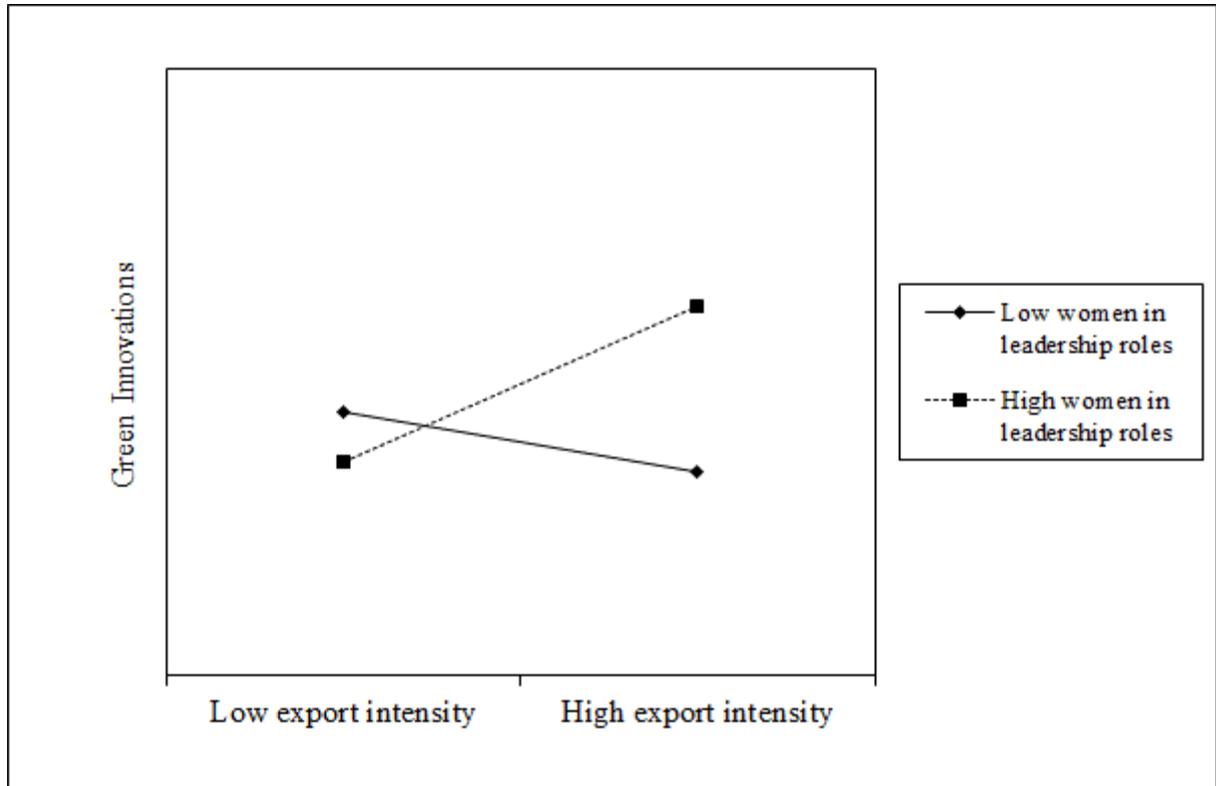


Figure 2. Plot analysis: Absorptive capacity

