ERASMUS UNIVERSITY ROTTERDAM
Erasmus School of Economics

Bachelor Thesis - International Bachelor Economics and Business Economics

Do SMEs benefit from Green Activities? An analysis on SMEs' Financial and Environmental Performance

Name student: Napassorn Nawawongwiwat

Student ID number: 464985

Supervisor: Brigitte Hoogendoorn

Second assessor: Eric Slob

Date final version: July 6th, 2020

Abstract

This paper aims to understand if it is worth for SMEs to take green actions in terms of financial (change in turnover and production costs) and environmental (green jobs) performance. Despite SMEs' substantial economic and environmental contribution, there are relatively less studies between greening activities and SMEs' performance. As a consequence, a sample of 10630 SMEs across 28 countries under Flash Eurobarometer survey on ''SMEs, resource efficiency, and green markets'' (no. 456) are used to scrutinize the effect of environment practices on SMEs. By performing Binary Logistic Regression, the results suggest a positive relation between greening activities and SMEs performance. By taking more environmental practices, SMEs are more likely to experience increasing turnover and a reduction in production costs. This illustrates potential incentives for SMEs to grow green for increasing economic performance and competitive advantage. Moreover, the resulting green jobs also suggest that SMEs' green actions additionally create social benefits by increasing expertise in green activities which further generate positive environmental impact in the future. This study, therefore, challenges the dominant idea that green actions cost more burden than benefits for smaller businesses. The empirical evidence suggests that green activities do benefit SMEs as well as society at large which calls for more private and public support in encouraging green implementation for the long term "clean and green" world.

Table of Contents

Table of Abbreviation

A

ANOVA	Analysis of Variance

C

CEIs	Corporate Environmental Initiatives

E

EACs	Environmental Awards and Certifications

G

GHG	Greenhouse Gas

S

SEM	Structural Equation Model
SMEs	Small and Medium Enterprises

V

VIF	Variance Inflation Factor

1. Introduction

Small and Medium Enterprises (SMEs) play a significant role in global economies by generating majority of employment and value added as well as contributing to innovation (OECD, 2017). They represent about 90 percent of businesses around the world and more than half of global employment (The World Bank Group, 2020). In emerging economies, formal SMEs contribute over 40 percent of national income. Therefore, the true economic value is underrepresented as informal SMEs are largely excluded. Despite SMEs' vital position in the economy, they are often overshadowed by large firms. George Stigler, the Nobel Prize Winner in 1982, claimed that small businesses deserve more attention in economics. Most of the economics theories are developed from observations of large businesses which may not be applicable on smaller firms. Small and large businesses not only differ in size but diverge greatly in terms of business organization. Small firms tend to give more attention to local consumers (Besser, 1999) and are more flexible than large firms in changing their business objective (Larson, 2000). Yet, small businesses are often young and unstable. They generally prioritize their mission to short term survival rather than long term profitability. On the other hand, large firms are equipped with more resources, skills, and experience to address societal concerns beyond profit maximization objective (Darnall, Henriques & Sadorsky, 2010). When looking specifically at environmental engagement, small businesses are less likely to offer as many green actions as large businesses. As sustainable commitment varies with firm size, the effect of green actions on firm performance is also expected to diverge. While SMEs are small in size, their contribution to environmental degradation is enormous. As they represent large part of the economy, they are also responsible for a sizeable part in environmental concern. SMEs contribute 60-70 percent of industrial pollution in Europe (OECD, 2018). Small businesses' individual environmental footprint may be low, however, their aggregate impact can, in some respects, exceed that of large businesses (OECD, 2015). Nonetheless, SMEs also engage in potential environment improvement, having more than 90 and 70 percent of clean tech enterprises in United Kingdom and Finland respectively. (OECD, 2017). As SMEs are economically and environmentally vital, reducing environmental impact of SMEs is the key success in greening economy.

Although the studies between greening activities and firm performance is well researched, the results are mixed and there are relative less studies on SMEs. While a literature review in Table A1 shows that some studies provide a positive relationship between environmental practices and economic performance (Starčević, Mijoč & Zrnić, 2017; Torugsa, O'Donohue & Hecker, 2012; Ar, 2012; Agan, Acar, & Borodin,

2013; Riillo, 2017; Leonidou, Christodoulides & Thwaites, 2016; Sáez-Martínez, Díaz-García & González-Moreno, 2016), other discovers the negative SMEs' growth from green implementation (Jové-Llopis & Segarra-Blasco, 2017; Gaur et al., 2011). As firm size determines the firm's greening engagement and actions (Bianche & Noci, 1998; Darnall, Henriques & Sadorsky, 2010), it may influence outcomes regarding the effect of environmental actions on firm performance. When looking more precisely at SMEs' sustainable management, many studies provide obstacles to their greening engagement. Bianche and Noci (1998) show that the lack of resources and skills are the main obstacles to SMEs' sustainable practices Correspondingly, Pimenova and Van Der Vorst (2004) also found that time and financial constraints are the challenges SMEs face in environmental management. This implies that SMEs greening actions are unjustified from economic and competitive perspective as the need of resources in turning green comes without any certain return. However, as the world are changing towards more sustainable development, sooner or later SMEs would be obliged to environmental policy. Recent studies (Hoogendoorn et al., 2015) are increasingly paying attention to the drivers of SME's positive environmental behavior. Threats and pressures from consumers, investors and public help motivating Environmental Management System adoption and increasing SMEs awareness (Anton, Deltas & Khanna 2004). As the market is demanding more sustainable practices, firms are expected to provide greener practices to survive in the new business atmosphere. So far SME's engagement in greening activities appear to comply to changing ecology and population.

Since SMEs are economically and environmentally vital, this paper will investigate if SMEs would benefit from green actions. The aforementioned theories and studies hence resulted in the following research question:

Are SMEs' greening activities related to firm performance?

As previous literature provides contradictory results regarding the relationship of environmental and firm performance, this study will provide insights towards SMEs' performance resulting from sustainable management to indicate if it is indeed beneficial for SMEs to implement green actions. In addition, while environmental performance has been researched on SMEs, no literature has explicitly defined green jobs as environmental performance. This paper will take a step further to investigate the relationship of green activities on green employment. Green jobs appear to implicitly create environmental impact in the future by filling in the gap of SMEs lack of knowledge in sustainable activities. Thus, green jobs can gradually reduce the SMEs' negative environmental impact, which explains EU's dedication in promoting it.

Given SMEs' crucial role in modern economy and their large contribution in environmental degradation as well as improvement, this study uses the sample of SMEs from *Flash Eurobarometer survey on ''SMEs, resource efficiency, and green markets'' (no. 456)* to provide empirical evidence regarding environmental activities and their performance. Binary logistic regressions are implemented to scrutinize this relationship. As a consequence, a positive relation is found to exist between green activities and firm financial (in terms of increased turnover and production costs reduction) as well as environmental-societal performance (in terms of green jobs).This finding is relevance for business sector as well as policy makers in promoting more sustainable business that creates business value without forgoing the environment. By taking green actions, SMEs not only reduce negative environmental impact but also improve their business performance in terms of change in turnover and production costs. This study, therefore, illustrates potential incentives of SMEs in green implementation. More importantly, the empirical evidence regarding green jobs provides a considerable added value to existing literature. Since green jobs creation is definitely the aim for society at large, SMEs can influence long term sustainability by participating more in green activities that will indirectly create more green jobs. Furthermore, as environmental issues become more noticeable across natural disasters, climate change and global warming (Starčević, Mijoč, & Zrnić, 2017), studies on sustainable entrepreneurship such has become increasingly vital in turning the world "clean and green".

The rest of the research paper is organized as follows: Section 2 provides the theoretical framework where the relationship between environmental activities and SMEs is discussed following by the explanation of the types of firm performance. These two key concepts are further developed into hypotheses formulation on the relationship between SME's environmental activities and their performance. Section 3 describes the sample and discusses the methodology of statistical analysis. The empirical evidence is given in Section 4 under Results. The last section summarizes the paper, discusses its limitation and suggests direction for future research.

2. Theoretical Framework

This chapter aims to provide a background of the relationship between SMEs' greening activities and their performance and will be organized into three sections. First, SMEs' peculiarities in engaging in environmental performance are discussed in Section 2.1. This is followed the assessment of previous empirical studies of SME's greening actions and their performance. Subsequently, Section 2.2 provides the definition of different types of firm performance: financial and environmental-societal performance.

Once a clear understanding of SME's engagement in environmental activities and different performance types are developed, the hypotheses are formulated in Section 2.3.

Although the relationship between greening practices and firm performance is well researched, the conclusion obtained have been very varied (Table A1, Appendix A). On one hand, positive association is established in eco-friendly activities and performance. Ar (2010) discovered a positive effect of green product innovation on firm performance and competitive capability among Turkish Manufacturing SMEs. The greater effect on competitive capability suggest that environmental activities not only influence individual performance significantly but also improve the firms' relative position within the market. This is developed from the theory by Porter and Van der Linde (1995). Greening implementation is inevitably costly and reduces market share. The authors claim that static view of environmental regulation assumed that technology, products, processes and customer needs are all fixed. However, in reality of modern competition where innovation plays a key role in determining competitiveness, ecofriendly technology can lead to improving productivity through lowering costs and increasing value to justify the premium price.

First movers in environmental strategy would have a competitive advantage in costs and experience against their competitors. So, the firms that are slow to recognize the opportunity from sustainable management will have to incur additional costs to reach the leader firm. A case study by Claver, Lopez, Milina and Tari (2007), building upon Porter and Van der Linde (1995)'s theory, likewise reveal a positive association between environmental management and firm performance. Furthermore, a "win-win" situation or improvement in both environmental and financial performance is acknowledged by Ambec and Lanoie (2008) as expenses incurred from pollution reduction can be partly or completely offset by gains made elsewhere.

Dangelico and Pontrandolfo (2015) also discovered a partial positive effect of environmental capabilities and collaborations on Italian SMEs' market and image performance. The capabilities to undertake environmental actions as well as abilities to collaborate with business and non-business actors positively affect firm market performance. However, only collaboration with non-business actors positively affects better image performance significantly. Although positive relationship is established, the authors suggest the need to prioritize actions to best improve performance from green actions

On the other hand, empirical evidence shows that environmentalism is negatively related to firm performance. Jaggi and Freedman (1992) found good pollution performance of pulp and paper firms in the United States is not rewarded by the market. In short run firm's profitability is negatively affected by pollution abatement activities due to heavy expenditures. As profit maximization is the main objective, the management continues to pollute the environment. An encouragement and strict environmental policies are, therefore, necessary to tackle negative relationship. Similarly, Cordeiro and Sarkis (1997) demonstrate a significant and negative relationship environmental proactivism and earnings-per-share performance among a sample of US firms. The results are discouraging for companies to seek to be environmentally proactive.

When analyzing the effect of environmental performance on shareholder value, Jacobs, Singhal along with Subramanian (2010) uncover insignificant market reaction to aggregated Corporate Environmental Initiatives (CEIs) and Environmental Awards and Certifications (EACs) announcements, which provide information about self-reported corporate efforts to avoid, mitigate, or offset the environmental impacts of the firm's products, services, or processes and information about recognition granted by third-parties specifically for environmental performance respectively. However, when looking specifically at CEI and EAC subcategories, market positively adjusted to announcements of charitable gifts for environmental causes and negatively to voluntary emission reductions. While many studies found a positive relation, others realized negative relation but Jacobs, Singhal along with Subramanian (2010) discovered an ambiguous result by indicating that market is selective in reacting to announcements of environmental performance. Compatibly, evidence from Japanese manufacturing firms present insignificant effect of waste emission and positive effect of greenhouse gas reduction on financial performance but only for whole sample and clean industries (Iwata & Okada, 2011). Thus, when taking into account initial greening condition, the result may differ significantly.

As we can see there is a lot of research on the relationship between greening activities and firm performance but unfortunately the results are mixed. This could be due to different type of variables used in different studies and different methodologies for analysis (Claver et al. (2006). For example, firm performance is a very broad term and researchers may define them differently. When looking at firm performance from a financial perspective, it can be viewed a profitability, costs, or earnings-per-share. When defining firm performance from the angle of competition it can be perceived as competitive advantage. By selecting dissimilar variables for analysis, the results can differ significantly. One factor that explain mixed results could also relate to firm size as company's green strategy is majorly determined by

it (Bianche & Noci, 1998; Darnall, Henriques & Sadorsky, 2010). Although small firms are less likely to undertake proactive environmental practices relative to larger firms, they are more responsive to stakeholders' pressure. While large firms have more resources to resist pressure for environmental change, smaller firms cannot afford greater costs and decide to comply with environmental pressure (Darnall, Henriques & Sadorsky, 2010). As firm size determines the firm's greening engagement and actions, it may influence outcomes regarding the effect of environmental actions on firm financial as well as environmental performance.

2.1 Environmental practices and SMEs

2.1.1 SMEs' engagement in environmental practices

Environmental Practices are defined as actions that seek to reduce the negative environmental impact caused by activities and processes under organizational development and improvement (ECOSOC, 2017). Some examples of environmental practices under this research are saving water, using predominantly renewable energy, saving materials, selling scrap to other company, recycling and eco-friendly product design. With increasing prominent climate change issues and depletion of natural resources, UNEP (2020) continuously encourages businesses to improve their resource efficiency and adopt sustainable practices. While green activities clearly generate positive impact on the environment, researches also discover significant relationship between environmental practices are firm performance. Nonetheless, existing research is focused majorly on large firms, and SME's are less well researched.

As there is a reason to assume that small and large businesses not only differ in size, the relationship between environment activities and performance could also be different. First, SMEs are seen as unenthusiastic in engaging in environmental practices and perceive green actions as a burden or threat (Hoogendoorn, Guerra & van der Zwan, 2015). Lin and Ho (2010) also found that environmental uncertainty has a negative influence on Taiwanese SMEs' decision to adopt green practices. As SMEs are less likely to engage in environmental practices, the effect on performance could differ from large firms that are more engaged. Secondly, the lack of financial resources and professional experience appear to be SMEs' main obstacle to green practices adoption (Del Brio & Junquera, 2003; Lin & Ho, 2010). While large enterprises are financially equipped to afford green activities, SMEs are less likely to do so. Thirdly, SMEs typically offer small scale of production. This implies that small firms that indulge in expensive environmental investment often generate higher operating costs (Jaccard & Bataille, 2002). Furthermore,

Etzion (2007) proposes that most environmental approaches could only produce positive return in long run. As small enterprises are often young and instable, they generally prioritize their mission to short term survival rather than additional societal and environmental benefits. However, SMEs also possess characteristics that may foster their engagement in environmental practices. When large companies have difficulties in implementing environmental practices due to organizational inertia, Jenkins (2004) as well as Larson (2000) reveal that SMEs' flexibility allow them to respond quickly and take advantage in new eco-friendly and sustainable niche markets. The authors further suggest that size is a key factor is facilitating environmental engagement. As we can see small and large business possess different characteristics that may foster or suppress environmental engagement differently, the relationship between environmental activities and performance could as well be different.

2.1.2 Relationship of environmental practices and SMEs' performance

The empirical studies on environmental practices and SMEs' performance summarized in Table A1 in Appendix A. and it is found that the results are mixed. While some studies provide a positive relationship between environmental practices and financial performance (Starčević, Mijoč & Zrnić, 2017; Torugsa, O'Donohue & Hecker, 2012; Ar, 2012; Agan, Acar, & Borodin, 2013; Riillo, 2017; Leonidou, Christodoulides & Thwaites, 2016; Sáez-Martínez, Díaz-García & González-Moreno, 2016) as well as competitive advantage (Rodriguez, Ulhoi & Madsen, 2016; Rodriguez, Ulhoi & Madsen, 2013; Dangelico & Pontrandolfo, 2015, Chen, Lai & Wen, 2006; Aragón-Correa et al., 2008; Ar, 2012), other discovers the negative SMEs' growth from green implementation (Jové-Llopis & Segarra-Blasco, 2017; Gaur et al., 2011).

Financial indicators like profit, sales, sales growth, market share, Return on Assets and Return on Investment are frequently used in existing analysis, but the effect on costs is relatively less explored. As costs play a prominent role in determining the competitive power and firm performance, more studies on costs is prominent for SMEs decision makers as well as policy makers. Moreover, studies have indicated the existence of environmental performance as a subset of firm performance (Claver et al., 2010), but none have deployed green jobs as an environmental indicator. The reason behind this could be explained by the fact that the number of green jobs is never an aim for firms. However, green jobs creation is definitely the aim for society at large for long term sustainability. SMEs are claimed to engage less in environmental activities because of the lack of information (Pimenova & Van Der Vorst, 2004). By generating green jobs, small businesses can overcome this issue by increasing expertise in green activities and create positive environmental impact in the future.

Table A1 also indicates that previous researches (Claver et al., 2007; Ar, 2010; Dangelico & Pontrandolfo, 2015) on environmental practices and SMEs' performance mainly focus on a particular geographical location or country which make generalization impossible. As a consequence, sample size implemented by the majority of existing literature is relatively small which increase the likelihood of statistical errors and the power of the study. Additionally, these studies predominantly implement OLS regression, one-way ANOVA and Structural Equation Modeling (SEM) as methodologies of analysis. It is also noticeable that studies on SMEs' greening activities and performance have become an interesting field of studies only in the recent years, having most studies being published in the 2000s. This could be explained by the **evidence** of rapid environmental damage and its consequences along with SMEs' enhancing contribution in economic growth.

Having acknowledged the limitations of previous researches, the paper will, therefore, scrutinize the study of environmental practices and firm performance, using cross-country data of SMEs in Europe and the United States to overcome the issues of cross-country generalization. Furthermore, larger sample size of 9757 observations will be used to ensure greater robustness. Binary logistic regression will also be performed to fill in the gap of existing literature. Besides, it will reveal the effect of green actions of production costs which is relatively less explored. Lastly, using green jobs will create added value to existing literature regarding the potential environmental improvement through green employment which lies within the society's interest. Therefore, the research will explore the relationship between green activities and SMEs' performance by building upon the limitations of previous studies and try to identify if it is indeed beneficial for SMEs to engage in greening activities.

2.2 Types of Firm Performance

While studies have shown different effect and magnitude of green activities on firm performance, it is important to clearly understand different types of firm performance. Claver et al. (2010) define firm performance as the combination of environmental performance, competitive advantage and economic performance. Figure 2.1 demonstrates the relationship of environmental strategy on different types of firm performance.

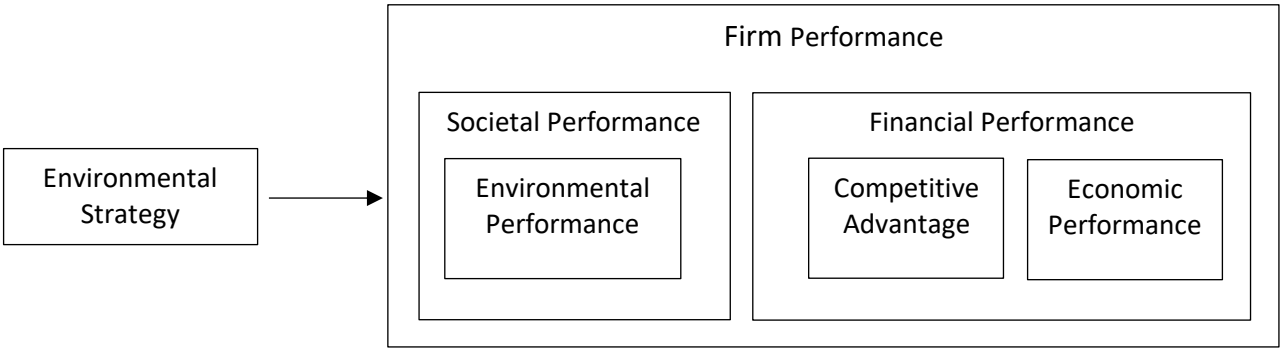

Figure 2.1. Types of Firm Performance (Claver et al., 2010)

2.2.1 Financial Performance

Firm financial performance can be seen as a combination of economic performance and competitive advantage. When measuring firm performance from environmental actions, it is not possible to apply only traditional economic performance indicators like profitability, return on assets, return on investment etc. Claver et al. (2010) claims that competitive advantage should also be taken into account as it isolates the effect of environmental practices on efficiency. While, economic performance refers to the economic output of the profit derived from the enterprise's management (Claver et al., 2010), competitive advantage is defined as an increase in an enterprise efficiency by costs reduction and/or product differentiation to justify the higher prices relative to competitors (Christensen, 2010). These two concepts implicitly promote one another and consequently foster firm financial performance.

2.2.2 Environmental Performance

Environmental Performance is the environmental impact that enterprise's activity has on the business natural atmosphere. Even though most studies (King & Lenox, 2001; Klassen & Whybark, 1999) focus on reduction of pollution emission as an indicator of environmental performance, this study will introduce green jobs as another environmental performance. While SMEs are concerned with increase profitability and costs reductions, they have no direct interest in relation to green jobs. However, as SMEs are subject to societal threat that demand more sustainable business operation, green jobs can be seen as an indirect environmental-societal performance indicator in meeting stakeholders' expectations. As earlier mentioned, green jobs can as a condition to future environmental improvement by increasing knowledge regarding green activities by having sustainable employees.

2.3 Hypotheses

Hypotheses are formulated in the context of SMEs' environmental practices and firm performance. Turnover and production costs are used as financial performance measurement. For environmental

performance, green jobs represent the environmental outcome of SME's greening actions. Hence, the conceptual framework of this research is proposed in Figure 2.2.

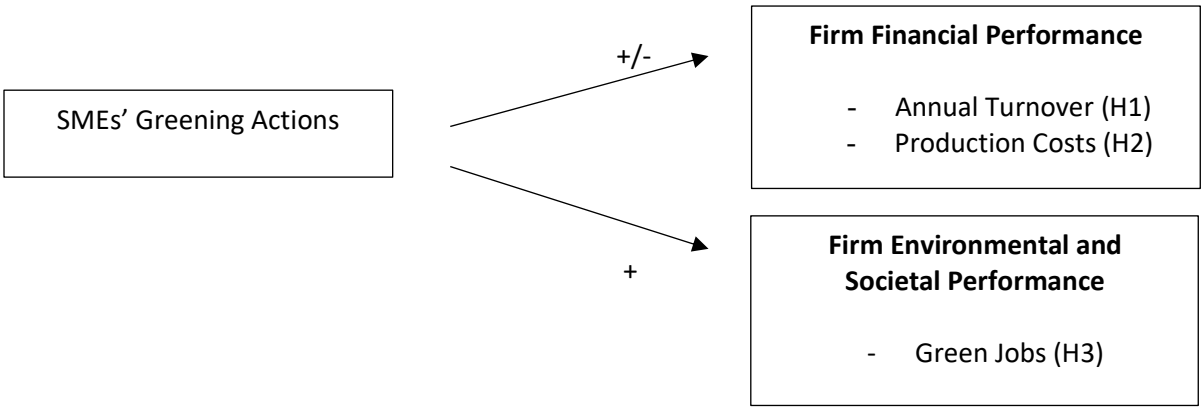

Figure 2.2 Relationship of SME's Greening Actions and Firm Performance

2.3.1 Turnover

As previous literatures indicate the association between greening activities and SMEs' performance, this is expected to hold when using the annual turnover as a performance indicator. Starčević, Mijoč, along with Zrnić (2017) observe that SMEs with green undertakings do generate higher turnover than non-green SMEs. Positive relationship between eco-innovation and turnover per employee is also recognized among Irish firms (Bigliardi, Doran & Ryan, 2012). They infer that customer pressures and expectations play an important role in determining eco-innovation that consequently improve turnover. When looking at SMEs, stakeholders' pressure significantly influences their business decision. Although SMEs are less likely to undertake green activities, they are more responsive to stakeholders' pressure (Darnall et al., 2010). Since customers perceive the superior value and quality from green processes and products, Greenan, Humphreys and McIvor (1997) claim that they will be willing to pay for premium which lead to expansion of green enterprises' profitability. Similarly, Ambec and Lanoie (2008) argue that even if green actions involve extra costs, those costs are likely to be transferred to customers who are willing to pay premium for green product and services. So, as SMEs are responsive to customer pressures and expectations, they will perform green activities and transfer additional costs to customers, leading increase in their profitability.

Furthermore, green activities also allow firms gain competitive advantage from eco-friendly business opportunity relative to non-green firms within the market. This consequently promote firms' turnover and profitability. As SMEs face the issues of resource constraint, when they are subject to increase environmental uncertainty, they are less likely to invest their scarce resources in response (Darnall, 2010).

Thus, they are required to adapt and enhance flexibility under environmental uncertainty (Guar et al, 2011). This gives rise to first mover advantage from quickly realizing the new opportunity and gaining experience in green market. Porter and Van der Linde (1995) also claim that green product and processes can also increase company's competitive advantage. So, turnover is expected to rise with greater competitive advantage among sustainable SMEs.

However, SMEs also possess characteristics that can reduce the magnitude of positive effect of environmental practices on performance or may even result in negative association. Jové -Llopis and Segarra-Blasco (2017) as well as Gaur et al. (2011) found that undertaking eco-activities is associated with reduced turnover in SMEs. Small firms are found to have more difficulties to environmentally innovate (Triguero & Mondéja, 2013; King & Lenox, 2001), but innovation is associated with growing sales (Colombelli, Krafft, & Quatraro, 2015). This can be explained by a low level of environmental knowledge and skills among small firms (Simpson et al., 2004). The lack of expertise in green activities can result in lower performance level. As SMEs are usually young and unstable, they mainly focus on short term survival and underestimate the benefits from eco-innovation. In addition, SMEs' small scale of production also explain the negative effect of green implementation. Bianchi and Noci (1998) suggest that small firm's green investment generate more costs than benefits in terms of scale economies. Moroever, Buysse and Verbeke (2003) suggest that SMEs are mostly involve in reactive rather than proactive environmental activities. By implementing green activities under environmental legislation, SMEs can be at a disadvantage when they are not financially equipped for greening activities. Palmer, Oates along with env the effect on turnover of environmental innovation strategy is recognized in short- medium run (Cainelli, Mazzanti & Zoboli, 2011). Likewise, Greenan, Humphreys and McIvor (1997) argue that eco-friendly activities will result in long term improved performance for the organization. When small businesses adjust to the new environmental practices, they can benefit from economies of scale and scope, resulting to long term performance improvement (Starčević, Mijoč, & Zrnić, 2017). As firms benefit from sustainable implementation through organizational costs reduction, greater reputation, additional innovative opportunities, and increase market power by differentiating from competitors who fail to recognize greening prospects, Johnson (2015) suggest that it will result in overall increase in competitiveness. However, this paper does not intend to use a long-term turnover for analysis, so the negative effect of green actions on turnover can be expected as well. In summary, contradictory arguments have been put forward. This paper will, therefore, investigate whether SMEs greening actions

create more costs or benefits in terms of turnover. Hence, both positive and negative relationships are hypothesized as follow:

H1a: SMEs greening actions are positively related to firm turnover

H1b: SMEs greening actions are negatively related to firm turnover

2.3.2 Production Costs

While the effect of green activities on environment is undoubtedly positive, the effect on production costs is less certain. On one hand, progresses to sustainable development are considered expensive. Jaccard and Bataille (2002) discovered that reduction in greenhouse gases (GHG) offsets consumer welfare and financial benefits which explain unsuccessful voluntary programs in the 1990s in reducing GHG emissions. In contradiction of Porter and Van der Linde (1995) environmental theory, Palmer, Oates along with Portney (1995) realize costs increased and profits reduced as an effect environmental regulation which erode firm's overall competitiveness and sometimes even push a firm to a brink of bankruptcy. This is explained by the idea of opportunity costs. With limited financial resources and professional experience, SMEs' capital investment under environmental programs could have been utilized more efficiently in labor force, capital base, financing, or research and development that may yields higher return. Bianchi and Noci (1998) claim that green strategy in unjustified from economic and competitive viewpoint as it requires resources and skills not available in SMEs which generate uncertain returns. Hence, green SMEs may incur higher costs from environmental protection.

More specifically, greening strategy usually involves higher operating costs with expensive environmental investment. This is explained by more sophisticated technology and facilities along with high-priced eco-friendly raw materials (Mao and Wang, 2017). King and Lenox (2002) comment further that onsite waste treatment often stipulate additional unexpected costs. OECD (2015) suggests that SMEs have a limited capacity to absorb environmental requirement and to comply with them, which lead to under- or overexploit factors to implement green actions. Moreover, entrepreneurs often lack information regarding environmental strategy and rely heavily on opinion of professional surrounding who also experience the same information failure (OECD, 2015). As SMEs are not equipped to greening implementation, it results in possible increased greening production costs. The costly execution of green activities also explains why SMEs are assumed to engage less in environmental activities.

Yet, green activities are also related to cost reduction. Non-green producers experience higher costs in terms of regulatory fines like taxation, pollution permits, or regulations prescribed by the government (Starčević, Mijoč, & Zrnić, 2017). This is supported by Lankoski (2010) who also claim that less pollution (or more green actions) means lower costs by avoiding potentially costly litigation and fines. Darnall et al. (2010) found that greater perceived pressure from regulatory and societal stakeholders are associated with an increase in likelihood to adopt proactive environmental practices and small firms are affected more by perceived pressure. As a consequence, small businesses respond to environmental regulators with greater vigor which lead to potential costs saving by avoiding environmental degradation penalties.

Moreover, Porter and Van der Linde (1995) also indicate that environmental practices encourage the efficient production method which lead to diminishing production costs. As a consequence, cost-saving behavior from green actions may also lead to new ways in converting waste into saleable product which generate additional revenues for green enterprises. Likewise, Bergmiller and McCright (2009) found that substitution of hazardous raw materials, use of returnable packaging, waste segregation, and creating a market for waste products lead to overall waste reduction which further imply total cost reduction. SMEs' shorter line of communication, closer interaction, presence of founder's vision, flexible external relationship and entrepreneurial orientation allow them to increase the prospective of cost-saving behavior (Aragon-Correa et al., 2008) by focusing on narrow market domains and streamlined operations (Chen and Hambrick, 1995).

So far there is conflicting empirical evidence regarding the costs associated with green activities. While some believe that environmental practices improve efficiency and reduce unnecessary production costs (Starčević, Mijoč, & Zrnić, 2017; Ambec & Lanoie, 2008; Bergmiller & McCright, 2009), others believe that green technology are often sophisticated and expensive (Palmer, Oates & Portney, 1995; Mao and Wang, 2017; King and Lenox, 2002). Therefore, this paper will try to scrutinize if green actions indeed relate to higher or lower SMEs' costs by formulating hypotheses as follow:

H2a: SMEs greening actions are positively related to firm costs

H2b: SMEs greening actions are negatively related to firm costs

2.3.3 Green Jobs

Environmental activities are expected to positively affect the number of green employments in SMEs. Cecere and Mazzanti (2017) explain that green jobs are positively associated with financial performance.

Thus, as SMEs implement green actions to improve their financial position, the successful green strategy also leads to creation of green jobs. Moreover, increase in green jobs also occur through re-organization of firm's structure (Cecere & Mazzanti, 2017). While SMEs decide to reorganize their business operation in turning green, specific green recruitment and green training occurs. This is supported by OECD (2011) who confirms that greening activities investment has a significant potential in creating green jobs.

In addition, UNEP (2008) states that stable climate and healthy ecosystem are essential for economic prosperity and employment. As small businesses are more sensitive to environmental uncertainty (Lin & Ho, 2010), without timely actions, resource depletion, biodiversity loss, increasing natural disaster impacts, and other disruptions may lead to destruction of business as usual. SMEs' flexibility enables them to respond quickly to changing circumstances, taking advantage of new niche markets for sustainable products and services with social and environmental benefits (Jenkins, 2004). Adapting to eco-friendly business, therefore, allow SMEs to enhance their environmental performance by generating sustainable employment.

In summary, SMEs possess characteristics that may foster their engagement in environmental activities which indirectly promote green jobs. Although SMEs aim to turn green in order to be economically competitive, greening actions implicitly enriches its position in environmental-societal performance. This can be understood as positive externalities. Although SMEs do not intend to take green actions to benefit the society, by doing so it inevitably creates more green employment which inevitably benefit the society. The link between environmental activities and green jobs may be intuitive but as little or no research has been conducted it is worthwhile to test this relationship empirically. Following the intuitive arguments, it is expected that green jobs will increase with green activities. The hypothesis is formulated as follow:

H3: SMEs greening actions are positively related to the number of green jobs

3. Data and Methodology

3.1 Data Source

In order to examine the relation between SME's greening actions and their performance, information from European Commission: *Flash Eurobarometer survey on ''SMEs, resource efficiency, and green markets'' (no. 456)* is obtained. The survey is managed by the TNS Political & Social network in 28 Member States of the European Union, Albania, the Former Yugoslav Republic of Macedonia, Montenegro, Serbia,

Turkey, Iceland, Moldova, Norway and the US between the 11th and 26th of September 2017. As a consequence, 15,019 telephone interviews were conducted on behalf of the European Commission. However, as this research focuses solely on SMEs, 1041 large enterprises which the European Union categorizes as firms with 250 persons employed or more are excluded from the dataset. Furthermore, some of the small EU member states (Cyprus, Malta and Luxembourg) and most of the non-EU countries surveyed (Albania, Iceland, Former Yugoslav Republic of Macedonia, Montenegro, Moldova and Serbia) have relatively small sample size which is sensitive to higher margin of error. This refers to an average of 167 observations comparing to other countries with a sample of around 500 SMEs. As a consequence, 1,501 observations from Cyprus, Malta, Luxembourg, Albania, Iceland, Former Yugoslav Republic of Macedonia, Montenegro, Moldova and Serbia are dropped to limit the possible errors in statistical analysis. Additionally, observations with missing values are also excluded which lead to the total of 10,630 SMEs.

3.2 Dependent Variables

3.2.1 Turnover

To measure the effect of greening actions on firm financial performance, change in turnover is considered as a dependent variable. The relevant question in the questionnaire is *"Over the past two years, has your company's annual turnover increased, decreased or remained unchanged?".* As we can see there are three possible answers leading to a categorical variable which make ordered logit regression a preferable methodology for econometrics analysis. However, when testing the proportional odds assumption, it is found that the assumption is not met. As a consequence, categories of decreased and remained unchanged are merged together as one category. Turnover is, therefore, a dummy variable which takes a value of 0 if turnover decreased or unchanged and 1 if increased.

3.2.2 Production Costs

Production costs is also measured in a similar way. SMEs were asked *"What impact have the undertaken resource efficiency actions had on the production costs over the past two years?"* The production costs have the possible value as decreased, not changed, or increased. However, there are significantly fewer SMEs that experience unchanged (26.63 percent) and increased (18.87 percent) production costs relative to costs reduction (54.75 percent) falsifying the proportional odds assumption of ordered logit regression. Likewise, this research decides to merge the two categories of unchanged and increase production costs

and proceed with two categories. Thus, the variable, production costs, is a dummy variable that takes a value of 0 when SMEs experience unchanged or increase in costs and 1 when there is costs reduction.

3.2.3 Green Jobs

To evaluate the extent of greening actions on green job, SMEs were asked "*In your company, how many of your full-time employees, including yourself, work in green jobs some or all of the time?"* and the possible answers are *0 employees, 1 to 5 employees, 6 to 9 employees, 10 to 50 employees, 51 to 100 employees* or *more than 100 employees.* The distribution of green employees is skewed to the right, having 54.76 percent of SMEs with no green employees, following by 31.43 percent of firms having 1 to 5 employees working in green jobs. There are only a 3.39 percent, 8.42 percent, 1.40 percent and 0.59 percent of SMEs with 6 to 9 employees, 10 to 50 employees, 51 to 100 employees and more than 100 employees working in green jobs respectively. Firms with dispersed distribution of green employees are, therefore, merged together as one variable under green jobs. Consequently, Green Jobs is a dummy variable with a value of 0 indicating 0 employee working in green jobs and a value of 1 indicating more than 1 employee working in green jobs.

3.3 Independent Variable

The independent variable is SMEs' greening actions which corresponds to questionnaire question *"What actions is your company undertaking to be more resource efficient?".* This variable is an ordered categorical variable with four categories. It takes a value from *no actions, few actions, some act*ions to *many actions.*

3.4 Control Variables

3.4.1 Firm Size

There is a reason to assume that firm size influences both number of greening actions as well as performance. Bianche and Noci (1998) show that firm size is inversely proportional to green strategy. Moreover, firm size also positively determines the firm financial performance (Babalola, 2008) as well as corporate social responsibility (Ioannou & Serafeim, 2010). Therefore, it is necessary to include firm size as control variable to avoid omitted variable bias. To estimate the firm size SMEs were asked *"How many employees does your company have?"* where *1 to 9 employees* represent micro firms, *10 to 49 employees* represent small firms and *50 to 249 employees* represent medium sized firms. Firm Size is, therefore, an ordered categorical variable ranging from micro, small to medium sized firms.

3.4.2 Firm Age

Firm age also influence the extent SMEs are engaged in greening actions. Older and more experienced firms often have more resources and capabilities to implement green actions (Amores-Salvadó, Martin-de Castro, & Navas-López, 2015). On the other hand, Hughes and Morgan (2007) also suggest that young firms are in a vulnerable position in competing with their competitors in a complex and uncertain business environment, which result in lower performance level. Thus, firm age is included as a control variable distinguishing between firms that have been established for *less than 1 year* (reference variable), *between 1 and 4 years, between 4 and 7 years* and *more than 7 years*. The relevant question in the questionnaire is "In what year was your company established?". Firm age is a categorical variable with four categories.

3.4.3 Business Sector

The business sector in which the firms belong to is also included and control variable. Ndemanga and Koffi (2009) found a strong link between environmental corporate social responsibility and industry sector. Industrial and Manufacturing is associated with negative externalities which causes global warming and climate change. As a consequence, companies in these sectors face tremendous pressure to mitigate those externalities and engage more in environmental practices relative to retail and services sector. A categorial variable which captures four business sectors: *Manufacturing* (reference variable), *Retail, Services* and *Industry,* is created.

3.4.4 Market Type

Following the stakeholders' theory, customers play a significant role in influencing SMEs' green actions. As customer increasingly demand sustainable business operations, they are willing to pay the premium for green product and services (Ambec & Lanoie, 2008). It is expected that businesses that directly sell their product and services to consumers are facing more pressure to exhibit green actions. Moreover, customer satisfaction and loyalty also significantly influence the firm performance. As market type is expected to influence both green actions and firm performance, it is included as control variable. Market type takes categorical value with four categories whether SMEs are selling its products and *services directly to consumers (reference variable), to other companies, to public administration* or *serving multiple markets.*

Table 3.1 Descriptive Statistic

Variables	Categories	Frequency	Percentage
Dependent Variables			
Change in Turnover	0 if unchanged or decreased	5,251	49.15
	1 if increased	5,433	50.85
Change in Production Costs	0 if unchanged or increased	3,780	45.25
	1 if decreased	4,574	54.75
Green Jobs	Number of employees in Green Jobs:		
	0 if no green employees	5,851	54.76
	1 if at least one green employee	4,833	45.24
Independent Variable			
Green Actions	No action [ref]	1,247	11.73
	Few actions	2,548	23.97
	Some actions	3,062	28.81
	Many Actions	3,773	35.49
Control Variables			
Firm Size	Number of employees:		
	1-9 employees [ref]	4,799	44.92
	10-49 employees	3,760	35.19
	50-249 employees	2,125	19.89
Firm Age	Less than 1 year [ref]	8,746	81.86
	Between 1 and 4 years	952	8.91
	Between 4 and 7 years	966	9.04
	More than 7 years	20	0.19
Business Sector	Manufacturing [ref]	2,354	22.03
	Retail	3,303	30.92
	Services	3,036	28.42
	Industry	1,991	18.64
Type of market served	Selling Product and Services:		
	Directly to consumers [ref]	2,521	23.60
	To other companies	3,115	29.16
	To public administration	167	1.56
	Multiple markets	4,881	45.69

Source: Flash Eurobarometer survey on ''SMEs, resource efficiency, and green markets'' (no. 456)
[ref] refers to reference variable

3.4.5 Country

The magnitude and diversity of environmental activities may differ per country due to specific environmental policies and regulations. Excluding country dummy from the statistical analysis may result in omitted variable bias. Thus, country dummy variables, specifying the country that SME belongs to, are added to the model to control for country-specific influences (Table B1, Appendix B).

3.5 Descriptive Statistics

The descriptive statistics is given in Table 3.1 below. This section provides the exact definition of variables that are used for analysis in this study. The numbers in the last column represent percentages of firms belonging to a specific category. There are 35.24 percent of SMEs that take many green actions which is relatively large than proportion of SMEs that take no green actions of 11.91 percent. When looking at firm age, the majority of SMEs (81.26 percent) are considered as young firms that were established within a year. Regarding the market type, there is only 1.64 percent of SMEs that sell their product and services to public administration. Table B1, Appendix B also describes SMEs greening actions by country. United States has the highest proportion of SMEs that take many green actions (57.86 percent) while Estonia has the highest proportion of SMEs that take no green actions (42.39 percent).

3.6 Methodology

To investigate the relationship between greening actions and firm financial as well as environmental performance, a quantitative analysis is implemented. Binary logistic regression will be executed with a statistical software, Stata MP 15.0, to explore the relationship. By taking Turnover, Production Costs and Green Jobs as dependent variable, Green Actions is chosen as explanatory variable. This statistical analysis also includes control variables in Section 3.4 for more accurate estimation.

To ensure unbiased estimates, assumptions of the regression are verified. First, binary logit regression requires a dummy dependent variable. As turnover, production costs and green jobs are all described dummy variables, they are suitable for this methodology of analysis. Secondly, binary logistic model typically requires a large sample size. Bujang, Sa'at and Bakar (2018) recommends a rule of event per variable (EPV) of 50 to calculate the minimum required sample size. The formula is given by $n = 100 + 50i$, where i refers to number of independent and control variables. Since this research propose 1 independent variable and 5 control variables, the minimum sample size is 400. Having 10,630 observations in the model indicates a large enough sample size.

Binary logistic regression also requires there to be little or no multicollinearity among the independent and control variables. Multicollinearity is a situation when two or more independent variables are highly linearly associated which may undermine the statistical significance of the explanatory variable. Table C1 in Appendix C reports the correlation matrix between independent variable and control variables. According to the rule of thumb, if the correlation coefficient exceeds 0.8 in absolute terms, it indicates a sign of severe multicollinearity (Farrar & Glauber, 1967). The highest coefficient found is 0.139 which is a correlation between Green Actions and country dummies. As there exists no correlation coefficient greater than 0.8, there is no sign of severe multicollinearity in this dataset. However, to confirm assumption, Variance Inflation Test (VIF) is performed to check if multicollinearity exists. Table C2 in Appendix C shows that all VIFs are below 10. Following the rule of thumb that if the VIF value is greater than 10, then there is multicollinearity (Yoo et al., 2014), it is concluded that no multicollinearity assumption is met.

3.6.1 Hypothesis 1

To scrutinize the positive relationship of turnover and SMEs' greening activities, a binary logit regression is performed. As firm size, firm age, business sector, type of market and country may influence the effect of turnover, they are included in the model as control variables. Eq. 1 demonstrates the Binary Logit Regression of turnover as below:

$$Turnover_i = \beta_0 + \beta_1 Green\ Actions_i + \beta_2 Firm\ Size_i + \beta_3 Firm\ Age_i + \beta_4 Business\ Sector_i + \beta_5 Market\ Type_i + \beta_6 Country_i + \varepsilon_i \qquad Eq.1$$

Where $Turnover_i$ is a dummy variable that take value 0 if turnover decreased or unchanged and 1 if increased in the past two years. $Green\ Actions_i$ refers to categories of greening actions of Firm i respectively. The model also includes control variables such as $Firm\ Size_i$, $Firm\ Age_i$, $Business\ Sector_i$, $Market\ Type_i$, and $Country_i$.

3.6.2 Hypothesis 2

The relationship between production costs and SMEs' greening activities is investigated in a similar way using a binary logit regression. Likewise, firm size, firm age, business sector, type of market and country are included in the model as control variables to avoid possible biased estimation. The Binary Logistic Regression of production costs is demonstrated as follow in Eq.2:

$$Production\ Costs_i = \beta_0 + \beta_1 Green\ Actions_i + \beta_2 Firm\ Size_i + \beta_3 Firm\ Age_i + \beta_4 Business\ Sector_i + \beta_5 Market\ Type_i + \beta_6 Country_i + \varepsilon_i \quad Eq.2$$

Where $Production\ Costs_i$ takes a value of 0 if production costs increase or unchanged and 1 if there is a decrease in production costs after implementing green activities of Firm i. $Green\ Actions_i$ refers to the categories of greening actions of Firm i. $Firm\ Size_i$, $Firm\ Age_i$, $Business\ Sector_i$, $Market\ Type_i$, and $Country_i$ are included as control variables in the model.

3.6.3 Hypothesis 3

A binary logistic regression is also performed to evaluate the relationship between green jobs and SMEs' greening activities. In order to ensure the robustness of the model, control variables like firm size, firm age, ownership, business sector, and type of market served are included. Turnover and Production Costs may also influence number of green jobs, but they are not included as control variables as they are directly or indirectly consequences of green activities. Eq. 3 represents the Logit Regression model of green jobs a below:

$$Green\ Jobs_i = \beta_0 + \beta_1 Green\ Actions_i + \beta_2 Firm\ Size_i + \beta_3 Firm\ Age_i + \beta_4 Business\ Sector_i + \beta_5 Market\ Type_i + \beta_6 Country_i + \varepsilon_i \quad Eq.3$$

Where $Green\ Jobs_i$ refers to whether there is a green employee in Firm i or not. $Green\ Actions_i$ refers to the categories of greening actions of Firm i. Correspondingly, $Firm\ Size_i$, $Firm\ Age_i$, $Business\ Sector_i$, $Market\ Type_i$, and $Country_i$ indicates control variables in the binary logit model.

4. Results

4.1 Results of Green Actions on Turnover

By performing the binary logit regression of green activities on turnover, the result is given in Table 4. Since Green Actions is a categorical variable, one category (*No Action*) is dropped out of regression to avoid multicollinearity and is used as a reference variable. Moreover, the coefficient in binary logistic regression does not indicate the marginal effect but denotes the sign of the likelihood of having experienced increased in turnover in the past two years by implementing green actions. The positive coefficient, therefore, suggests a positive association between green activities and SMEs' annual turnover

which supports *Hypothesis 1a*. In the other words, SMEs that engage more in green actions have a higher probability in experiencing increased in turnover over the past two years compared to have undertaken *No Action*. Having *No Action* as a reference, taking few, some or many actions are all positively and significantly related to increase in SMEs' annual turnover. When looking at the extent of green engagement, *Many* Actions is found to have the highest likelihood in relating to turnover. Moreover, when comparing Model 1 and 2 it is found that the pseudo R-square increases (0.058 to 0.059) when green actions is included. Although the predictability of the model rises with the inclusion of green actions, this difference is considerably small, suggesting that change in turnover is not significantly explained by green actions.

For better interpretation marginal effect is calculated for each level of green actions (Table D1, Appendix D). SMEs that take *Few Actions* regarding green processes are on average 4.8 percent more likely to experience an increase in turnover over the past two years compared to those SMEs that do not undertake green actions. When SMEs take slightly more actions shifting from *Few Actions* to *Some Actions*, the in probability of having increased turnover remained unchanged. SMEs that take *Some Actions* regarding green processes are similarly 4.8 percent more likely to experience an increase in turnover over the past two years relative to those SME's that undertake no green actions. Unsurprisingly, *Many Actions* SMEs have the highest likelihood of 6.7 percent in experiencing increase in turnover in the past two years compared to undertaking *No Action*. This shows that green implementation is stronger related to turnover once SMEs' implement more of it. Moreover, it is also noticeable that SMEs are most likely to experience increased in turnover during the middle age category or between 4 to 7 years. This suggests an inverted-U relationship between firm age and increased turnover. Deeper analysis whether firm age determines the magnitude of impact of green actions can be discovered by performing interaction effect. However, this is beyond the scope of analysis of this study, leaving a possible direction for future research.

4.2 Results of Green Actions on Production Costs

The result of binary logistic regression of green activities on production costs is also given in the third column of Table 4. Since question related to production costs in the questionnaire concerns only firms that do take green actions, No Action is dropped out. This consequently leads to lower number of observations, but it is large enough to fulfil the validity of this regression model. To avoid multicollinearity, Few Actions is used as a reference variable in this model. According to Table 4, there is a statistically significant positive association between green actions and the more likely to experience a reduction in production costs. It is also found that the positive relation is highest among *Many Actions*. As the

coefficient increases with the extent of green actions (0.323 to 0.854 of *Some Actions* to *Many Actions*), it suggests that the more green actions taken by SMEs, the greater the probability of reduced costs relative to SMEs that take few green activities. Hence, SME's green actions is negatively related to production costs which supports Hypothesis 2b and correspondingly rejects Hypothesis 2a. SMEs. Similarly, when comparing to the Model 1 with excludes green actions, having green actions increase pseudo R-square from 0.035 to 0.053 showing that the model better predicts the outcome.

The coefficient of binary logit regression, like ordered logit regression, does not indicate the marginal effect but denotes the sign of the likelihood of having a decline in production costs when taking green actions. The third column of Table D, Appendix D, indicates the positive marginal effect of SMEs that take some or many green actions on a decline in production costs. SMEs that take *Some Actions* are on average 8.1 percent more likely to experience costs reduction compared to SMEs that undertake *Few Actions* as a consequence of green implementation. Likewise, SMEs that take *Many Actions* in terms of sustainable production are on average 20.9 percent more likely to experience reduction in production costs relative to have undertaken *Few Actions.* Comparable to turnover, the greener activities executed by SMEs', the more likely they will experience costs reduction. While firm age and business sector significantly influence decline in production costs, firm age and market type have no significant influence. Although it is expected that young firms are in vulnerable position and may be less likely to experience competitive advantage in terms of costs reduction, it appears that firm age do not significantly determine the likelihood of costs reduction. Deeper understanding of firm age can be discovered through interaction effect of firm age and green actions which is beyond of the scope of this research. Similarly, it is expected that firms that undertake green actions can push additional costs to customers who are willing to pay premium for green product and services and experience costs advantage. Nonetheless, whether product and services are being sold directly to customers, other companies, public administration, or multiple markets, it does not have significant influence on production costs reduction. This gives rise to avenues for future research in understanding the relationship of production costs with firm age and business sector profoundly.

4.3 Results of Green Actions on Green Jobs

In order to investigate the relationship between green activities and green jobs, binary logistic regression is executed. The results in given in the last column of Table 4. Having No Action as a reference, it is found that taking few, some and many green actions are all positively related to the number of green employments at 5 percent significance level. This signifies that SMEs that take green activities are on average more likely to generate green jobs relative taking none of green actions which corresponds to

Table 4 Binary Logistic Regression. Explanatory variable: *Green Actions*

	Change in Turnover		Change in Production Costs		Green Jobs	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Green Actions						
No Actions [ref]						
Few Actions		0.194***				0.743***
		(0.074)				(0.088)
Some Actions		0.193***		0.323***		1.083***
		(0.075)		(0.061)		(0.088)
Many Actions		0.269***		0.854***		1.798***
		(0.076)		(0.062)		(0.089)
Firm Size						
Micro [ref]						
Small	0.662***	0.646***	0.212***	0.162***	0.200***	0.085*
	(0.047)	(0.047)	(0.052)	(0.053)	(0.048)	(0.049)
Medium	0.958***	0.929***	0.562***	0.457***	0.728***	0.530***
	(0.057)	(0.058)	(0.063)	(0.064)	(0.059)	(0.061)
Firm Age						
Less than 1 year [ref]						
Between 1 and 4 years	0.666***	0.671***	0.032	0.056	0.042	0.083
	(0.073)	(0.073)	(0.082)	(0.084)	(0.075)	(0.078)
Between 4 and 7 years	0.941***	0.947***	0.014	0.029	0.034	0.071
	(0.074)	(0.074)	(0.082)	(0.083)	(0.074)	(0.077)
More than 7 years	-0.242	-0.257	0.832	0.757	0.495	0.439
	(0.473)	(0.473)	(0.585)	(0.586)	(0.466)	(0.474)
Business Sector						
Manufacturing [ref]						
Retail	0.068	0.083	-0.310***	-0.252***	-0.201***	-0.078
	(0.058)	(0.059)	(0.064)	(0.065)	(0.060)	(0.062)
Services	0.060	0.090	-0.301***	-0.193***	-0.363***	-0.141**
	(0.059)	(0.059)	(0.065)	(0.066)	(0.060)	(0.063)
Industry	-0.196***	-0.183***	-0.385***	-0.325***	0.021	0.149**
	(0.066)	(0.066)	(0.072)	(0.072)	(0.067)	(0.070)
Market Type						
Directly to consumers [ref]						
To other companies	0.273***	0.279***	0.053	0.074	0.079	0.127**
	(0.059)	(0.059)	(0.066)	(0.067)	(0.061)	(0.063)
To public administration	-0.018	-0.018	0.110	0.142	0.362**	0.414**
	(0.169)	(0.169)	(0.188)	(0.190)	(0.173)	(0.178)
Multiple markets	0.360***	0.351***	0.089	0.052	0.251***	0.196***
	(0.053)	(0.054)	(0.060)	(0.061)	(0.055)	(0.057)
Country Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-1.222***	-1.450***	-0.210	-0.787***	-0.644***	-2.075***
	(0.122)	(0.140)	(0.128)	(0.139)	(0.122)	(0.149)
No. of Observations	10630	10630	8354	8354	10630	10630
Pseudo R-Square	0.058	0.059	0.035	0.053	0.094	0.134

Standard errors in parentheses
* p<.10, ** p<.05, *** p<.01

Hypothesis 3. The model reliability is explained by an increase in pseudo R-square (from 0.094 to 0.134) when comparing a model with and without green actions.

To gain better understanding of the positive association, the marginal effect is calculated (Table D2, Appendix D). SMEs that take Few Actions in terms of green activities are 14.5 percent more likely to have employees working in green jobs compared to those SMEs that do not undertake green actions. When slightly more green activities are implemented, the likelihood of having green workers is increased to 22.6 percent (among *Some Actions* takers relative *to No Actions* takers). When SMEs perform Many Actions, they are 40.3 percent more likely to create sustainable employees relative to those SMEs that undertake no green actions. As we can see, the extent to which SMEs perform their green activities significantly determine the likelihood of green jobs generation, as more green actions are related to higher probability of having green employees within the firm. It is also noticeable that firm size does play a significant role in determining the likelihood of having green employees. As expected, medium sized firms have the highest likelihood in having green jobs relative to micro firms, while small sized firms do not significantly generate sustainable employment compared to micro firms. In addition, industrial sector is more likely to have SMEs with green jobs while services are less likely compared to manufacturing sector. This lies within the expectation as manufacturing and industrial sector face more pressure to mitigate environmental issues relative to retail and services sector.

4.4 Robustness Check

To ensure the quality of regression models performed in Table 4, a robustness check is performed (Table E1, Appendix E). First, a different independent variable is used by focusing on green investment or the intensity of green actions in term of turnover. The corresponding question from the questionnaire is “Over the past two years, how much have you invested on average per year to be more resource efficient?” and the possible answers are no investment, less than 1 percent of annual turnover, between 1 to 5 percent of annual turnover or more than 5 percent of annual turnover. Binary logit regressions are performed on turnover, production costs and green jobs. The results are in accordance with the result in Table 4 in terms of sign and significance level. However, the magnitude differs slightly as highest green investment group does not have the highest likelihood in associating with decreased production costs. Instead, second highest category of green investment (1 to 5 percent of annual turnover) is most likely to experience costs reduction.

4.5 Additional Analyses

An additional analysis is made on the effect of different types of green actions on firm performance (Table F1, Appendix F). This is performed similarly by using another different independent variable by focusing on the types of actions that SMEs undertake. SMEs were asked "What actions is your company undertaking to be more resource efficient?" with seven possible options: save water, save energy, use predominantly renewable energy, save materials, minimize waste, sell scrap materials to another company, recycle and design sustainable products. After verifying the assumptions, binary logistic regressions are performed on the new independent variables. When looking at different green actions, saving water, saving energy and selling scrap to other company has a negative sign but statistically insignificant. Only recycling and sustainable design appear positively related to SMEs' turnover. When looking at the relation between production costs and different options of green activities, all but saving water and minimizing waste, are significantly related to the decrease in production costs. All types of green activities are positively related to number of green employees at 5 percent significance level. As we can see different types of green activities may result in different outcome. Further research on types of the green actions and firm performance will be extremely beneficial to SMEs and policy makers.

5. Discussion and Conclusion

This paper aims to understand the direction of SMEs' greening actions on firm performance by considering two types of performance: financial and environmental performance. Although some researches have analyzed the relationship between SMEs' environmental practices and financial performance, the results are conflicting. This paper examines this relationship by focusing on change in turnover and production costs. Given green jobs' importance in implicitly influencing long-term environmental impact, the association between green jobs and green actions is scrutinized. SMEs' peculiarities are used to formulate the hypotheses and a positive relationship of green actions and firm performance is established

5.1 Discussion of Results

With respect to the relation of green actions and change in turnover, it is found that green actions do significantly and positively influence the change in turnover. This conclusion is based on SME's flexibility and their responsiveness to stakeholders. SMEs' flexibility allows them to respond quickly and take advantage in new eco-friendly and sustainable niche markets (Jenkins, 2004; Larson, 2000). As SMEs are able to adapt quickly under environmental uncertainty, they are able to obtain first mover advantage from acknowledging new entrepreneurial opportunities. Small businesses' sensitivity to stakeholders' pressure (Darnall et al., 2010) cause them to comply with customers pressure and expectations. When SMEs offer

products and services with superior value, they are able to gain competitive advantage. Moreover, customers' willingness to pay premium of green products and services allow SMEs' turnover to increase by transferring additional costs customers. SMEs' increased in turnover corroborates with the line of research that view improved financial performance as a consequence of First Mover Advantage in the green market (Porter & Van der Linde, 1995). Nonetheless, the result of this paper is against some literatures that infer a negative relation of environmentalism and firm performance due to the lack of environmental expertise (Simpson et al., 2014) and resources (Bianchi and Noci, 1998). A possible reason could be different types of green actions. Some green activities may positively influence turnover, while others can negatively do so (Table F1, Appendix F). However, the exact mechanisms call for further research.

Regarding the production costs, the results indicate that green actions negatively influence production costs. This implies that by taking more environmental practices, SMEs are more likely to experience a decline in production costs. The result is driven by the ability to avoid unnecessary costs involved from environmental degradation in terms of fines and penalties (Starčević, Mijoč, & Zrnić, 2017; Lankoski, 2010), more efficient production in terms of hazardous raw materials substitution, use of returnable packaging, waste segregation, and creating a market for waste products (Bergmiller & McCright, 2009) which arise from entrepreneurial prospective cost-saving behavior among SMEs (Aragon-Correa et al., 2008). The empirical result, therefore, suggests that environmental practices do improve SMEs efficiency by reducing unnecessary production costs. This overwhelms the belief that SMEs are unequipped to implement green actions due to sophisticated and expensive green technology (Mao and Wang, 2017). SMEs may experience expensive green invest along with some difficulty during the early course, however, their flexibility allows them to quickly familiarize and positively benefit from greening actions. This is related to the concept of *Learning Effect* where cost advantage arises as green production becomes more familiar. Nevertheless, deeper understanding on learning effects and economies of scale is required.

The result on green jobs is in accordance to the formulated hypothesis. It is observed that SMEs that take more green activities are positively and significantly associated with green jobs. This raise question regarding the prominence of green jobs. Although there is no direct influence of green jobs on the environment and society, green jobs creation can implicitly promote social welfare by raising environmental awareness among SMEs for long term sustainable business operations. This is why governments, non-governmental organizations, and international bodies including the European Commission seek to promote the creation of green jobs (Furchtgott-Roth, 2012). Since none of existing

literature have indicated green jobs as environmental performance and empirically tested the relationship between green jobs and green activities, this study contributes greatly to sustainable entrepreneurship literature. It has provided empirical evidence that green actions driven by SMEs' self-interest can additionally impact the society. As a consequence, environmental practices can be seen as positive externality: SMEs' take green actions to obtain private benefits in terms of financial performance but there are also benefits to the rest of society in terms of sustainable employment. In practice, policy makers need to step up to encourage more green actions to maximize social welfare. However, the intuitive description of green jobs as environmental performance demands more nuanced understanding which offers a generous opportunity for further research.

5.2 Implications

This study has provided the empirical evidence regarding the positive relationship between SMEs' greening actions and their performance which augmented to sustainable entrepreneurship literature in a number of ways. First, SMEs' economic incentives in implementing green activities have been revealed. As environmental practices relate to increase in turnover and decline in production costs, SMEs are motivated to take green actions to improve their competitive position. Since the association of green activities is positive, this suggests that there is room for policy interventions aimed at raising awareness among SMEs of the advantages of in operating business sustainably. Second, this research has defined green jobs as firm environmental performance in contrast to existing literature (King & Lenox, 2001; Klassen & Whybark, 1999) that use reduction in pollution emission. Although firms are not directly interested in creating green jobs, they are subjected to societal pressure for sustainable business which made green jobs a possible performance indicator under environmental-societal performance. As ILO (2020) indicates that green jobs are central to environmental protection, economic development and social inclusion, examining SMEs' performance from the society viewpoint enriches the gap of previous literature. Third, this study highlights the additional potential benefits from green activities. Despite the private benefits in terms of financial performance, SMEs also create sustainable employment that benefit the society at large from environmental practices. The result suggests that SMEs' greening actions can potentially enhance decent sustainable employment even if they do not intend to do so. Governmental support in driving more green activities will not only bring about SMEs' private benefit but also generate societal benefits in terms of green working atmosphere. Lastly, it is also noticeable that the majority of SMEs (88.27 percent) take green actions in their production process. However, some South-Eastern European countries (Greece, Estonia, Lithuania, Bulgaria and Romania)

implement relatively lower green actions as shown in Table B1, Appendix B. As positive effect is found on SMEs' performance, it would be beneficial to encourage to take more green actions among these countries in order to be economically and environmentally efficient. Therefore, government of the above-mentioned countries should more active policies to push SMEs' towards sustainable entrepreneurship for their own benefits as well as societal advantage.

In summary, this study has discovered that increased turnover and costs reduction are expected from SMEs' green implementation. This verifies the research that discover the positive association between green strategy and financial performance (Starčević, Mijoč, & Zrnić, 2017; Ambec & Lanoie, 2008; Bergmiller & McCright, 2009; Greenan, Humphreys & McIvor, 1997). It also provides an important information to business and public sectors regarding the societal benefits from green jobs generation following SMEs' greening activities. Importantly, it is discovered at some countries are comparatively less active in green activities and policy shall enforce SMEs towards for actions for long term sustainability.

5.3 Limitations

The contribution of this research must be considered in light of its limitations. Firstly, although there is a good reason to expect that green actions affect firm performance from both theory and extensive empirical evidence, this paper is limited to establish casual interpretation of the results given the nature of Flash Eurobarometer cross-sectional data. As a consequence, an issue of reverse causality cannot be tackled. For example, it is unclear whether green activities cause better performance among SMEs or whether better performed SMEs engage in more green activities. Moreover, the data derived from *Flash Eurobarometer survey on ''SMEs, resource efficiency, and green markets'' (no. 456)* is based solely on information derived from SMEs in 2017. This limits the possibility to further scrutinize the long-term relationship between green activities and SMEs' performance. In order to overcome this concern, it is recommended to obtain time series and/or panel data for statistical analysis.

Although this research has implemented statistical analysis on cross-country data to overcome the generalization issue by the existing literature, it focuses on more economically developed country in the Norther Hemisphere. Subsequently, the empirical results cannot be generalized to SMEs in developing countries where SMEs are more likely to be created out of necessity rather than opportunity in the West. Finally, binary logit regression is used for analysis after recognizing the shortcomings in implementing ordinal logit regression. Lastly, change in turnover and production costs are ordered categorical variables

which makes ordered logistic regression a preferable methodology of analysis. However, when Brant testis performed, the proportional odds regression assumption is violated. This study, therefore, decided to merge some categories of dependent variables together to proceed further with binary logistic regression to achieve a reliable result. In the other words, this research is limited by the opportunity to perform ordinal logistic regression that may provide and noteworthy results.

5.4 Conclusion

As environmental issues become more visible through natural disasters, climate change and global warming, sustainable entrepreneurship has become a significant actor in reducing environmental impact. Despite the environmental advantages from taking green actions, this study has scrutinized the relation of greening actions and different types of firm performance with an attempt in answering the following research question: *Are SMEs' greening activities related to firm performance?* By performing binary logistic regression on data from *Flash Eurobarometer survey on ''SMEs, resource efficiency, and green markets'' (no. 456)*, a significant positive effect of green actions on firm performance is realized. Green business is found to offers a new market opportunity for SME in terms of increase turnover and decline costs. In addition, SMEs' green actions is found to create social benefits in terms of sustainable employment. This study, therefore, challenges the dominant idea that green actions cost more burden than benefits for SMEs. This verifies the significance of sustainable business operation among SMEs and insists on the importance of governmental support in pushing more SMEs towards greener operation. Therefore, the conclusion and the answer to the research question is that SMEs' greening activities do relate to firm performance positively both in financial and environmental context. Nevertheless, this research faced number of limitations. Further research SMEs' greening activities and firm performance is recommended to determine the cause and effect relationship by using panel data and more advanced statistical methodology. As developing countries contribute increasingly to environmental degradation, empirical analysis among these countries would be highly beneficial to policy makers in combating environmental impact. In summary, greening activities positively related to SMEs themselves, society as well as the environment. By raising the awareness on environmental protection, economic prosperity will be flourished without hindering future generations.

References

Agan, Y., Acar, M. F., & Borodin, A. (2013). Drivers of environmental processes and their impact on performance: a study of Turkish SMEs. Journal of cleaner production, 51, 23-33.

Ambec, S., & Lanoie, P. (2008). Does it pay to be green? A systematic overview. *The Academy of Management Perspectives*, 45-62.

Amores-Salvadó, J., Martin-de Castro, G., & Navas-López, J. E. (2015). The importance of the complementarity between environmental management systems and environmental innovation capabilities: A firm level approach to environmental and business performance benefits. *Technological forecasting and social change*, *96*, 288-297.

Anton, W. R. Q., Deltas, G., & Khanna, M. (2004). Incentives for environmental self-regulation and implications for environmental performance. Journal of environmental economics and management, 48(1), 632-654.

Ar, I. M. (2012). The impact of green product innovation on firm performance and competitive capability: the moderating role of managerial environmental concern. *Procedia-Social and Behavioral Sciences*, *62*, 854-864.

Aragón-Correa, J. A., Hurtado-Torres, N., Sharma, S., & García-Morales, V. J. (2008). Environmental strategy and performance in small firms: A resource-based perspective. *Journal of environmental management*, *86*(1), 88-103.

Arend, R. J. (2014). Social and environmental performance at SMEs: Considering motivations, capabilities, and instrumentalism. Journal of Business Ethics, 125(4), 541-561.

Babalola, Y. A. (2013). The effect of firm size on firms profitability in Nigeria. *Journal of economics and sustainable development*, *4*(5), 90-94.

Bergmiller, G. G., & McCright, P. R. (2009, May). Are lean and green programs synergistic. In *Proceedings of the 2009 Industrial Engineering Research Conference* (pp. 1155-1160).

Besser, T. L. (1999). Community involvement and the perception of success among small business operators in small towns. *Journal of Small Business Management*, *37*(4), 16.

Bianchi, R., & Noci, G. (1998). " Greening" SMEs' Competitiveness. Small Business Economics, 11(3), 269-281.

Bigliardi, B., Bertolini, M., Doran, J., & Ryan, G. (2012). Regulation and firm perception, eco-innovation and firm performance. *European Journal of Innovation Management*.

Bujang, M. A., Sa'at, N., & Bakar, T. M. I. T. A. (2018). Sample size guidelines for logistic regression from observational studies with large population: emphasis on the accuracy between statistics and parameters based on real life clinical data. The Malaysian journal of medical sciences: MJMS, 25(4), 122.

Buysse, K., & Verbeke, A. (2003). Proactive environmental strategies: A stakeholder management perspective. Strategic management journal, 24(5), 453-470.

Cainelli, G., Mazzanti, M., & Zoboli, R. (2011). Environmentally oriented innovative strategies and firm performance in services. Micro-evidence from Italy. *International Review of Applied Economics*, *25*(1), 61-85.

Cecere, G., & Mazzanti, M. (2017). Green jobs and eco-innovations in European SMEs. Resource and Energy Economics, 49, 86-98.

Chen, M. J., & Hambrick, D. C. (1995). Speed, stealth, and selective attack: How small firms differ from large firms in competitive behavior. Academy of management journal, 38(2), 453-482.

Chen, Y. S., Lai, S. B., & Wen, C. T. (2006). The influence of green innovation performance on corporate advantage in Taiwan. Journal of business ethics, 67(4), 331-339.

Claver, E., Lopez, M. D., Molina, J. F., & Tari, J. J. (2007). Environmental management and firm performance: A case study. *Journal of environmental Management*, *84*(4), 606-619.

Colombelli, A., Krafft, J., & Quatraro, F. (2015). *Eco-innovation and firm growth: Do green gazelles run faster? Microeconometric evidence from a sample of European firms*(No. 88). WWWforEurope Working Paper.

Cordeiro, J. J., & Sarkis, J. (1997). Environmental proactivism and firm performance: evidence from security analyst earnings forecasts. *Business strategy and the environment*, *6*(2), 104-114.

Dangelico, R. M., & Pontrandolfo, P. (2015). Being 'green and competitive': The impact of environmental actions and collaborations on firm performance. *Business Strategy and the Environment*, *24*(6), 413-430.

Darnall, N., Henriques, I., & Sadorsky, P. (2010). Adopting proactive environmental strategy: The influence of stakeholders and firm size. *Journal of management studies*, *47*(6), 1072-1094.

Del Brìo, J. A., & Junquera, B. (2003). A review of the literature on environmental innovation

Del Brìo, J. A., & Junquera, B. (2003). A review of the literature on environmental innovation management in SMEs: implications for public policies. *Technovation*, *23*(12), 939-948.

ECOSOC. (2017). Guide of Good Environmental Practices. Retrieved from https://promocionsocial.org/wp-content/uploads/2018/04/Guide-Good-Environmental-Practices-Social-Promotion-Foundation-2017-10-09.pdf

Etzion, D. (2007). Research on organizations and the natural environment, 1992-present: A review. *Journal of Management*, *33*(4), 637-664.

Farrar, D. E., & Glauber, R. R. (1967). Multicollinearity in regression analysis: the problem revisited. The Review of Economic and Statistics, 92-107.

Furchtgott-Roth, D. (2012). The elusive and expensive green job. *Energy economics*, *34*, S43-S52.

Gaur, A. S., Mukherjee, D., Gaur, S. S., & Schmid, F. (2011). Environmental and firm level influences on inter-organizational trust and SME performance. Journal of Management Studies, 48(8), 1752-1781.

Greenan, K., Humphreys, P., & McIvor, R. (1997). The green initiative: improving quality and competitiveness for European SMEs. *European Business Review*.

Hoogendoorn, B., Guerra, D., & van der Zwan, P. (2015). What drives environmental practices of SMEs?. *Small Business Economics*, *44*(4), 759-781.

Hughes, M., & Morgan, R. E. (2007). Deconstructing the relationship between entrepreneurial orientation and business performance at the embryonic stage of firm growth. *Industrial marketing management*, *36*(5), 651-661.

ILO. (2020). Green jobs. Retrieved from https://www.ilo.org/global/topics/green-jobs/lang--en/index.htm

Ioannou, I., & Serafeim, G. (2010). *What drives corporate social performance?: International evidence from social, environmental and governance sources*. Cambridge, MA: Harvard Business School.

Iwata, H., & Okada, K. (2011). How does environmental performance affect financial performance? Evidence from Japanese manufacturing firms. *Ecological Economics*, *70*(9), 1691-1700.

Jaccard, M., & Bataille, C. (2002). If sustainability is expensive, what roles for business and government? A case study of GHG reduction policy in Canada. *Journal of Business Administration and Policy Analysis, 30*, *31*, 149-184.

Jacobs, B. W., Singhal, V. R., & Subramanian, R. (2010). An empirical investigation of environmental performance and the market value of the firm. *Journal of Operations Management*, *28*(5), 430-441.

Jaggi, B., & Freedman, M. (1992). An examination of the impact of pollution performance on economic and market performance: pulp and paper firms. *Journal of business finance & accounting*, *19*(5), 697-713.

Jenkins, H. (2004). A critique of conventional CSR theory: An SME perspective. *Journal of general Management*, *29*(4), 37-57.

Johnson, M. P. (2015). Sustainability management and small and medium-sized enterprises: Managers' awareness and implementation of innovative tools. Corporate Social Responsibility and Environmental Management, 22(5), 271-285

Jové-Llopis, E., & Segarra-Blasco, A. (2017). Eco-strategies and firm growth in European SMEs. *XREAP2017-15*.

King, A. A., & Lenox, M. J. (2001). Does it really pay to be green? An empirical study of firm environmental and financial performance: An empirical study of firm environmental and financial performance. *Journal of Industrial Ecology,* 5(1), 105-116.

King, A., & Lenox, M. (2002). Exploring the locus of profitable pollution reduction. *Management Science*, *48*(2), 289-299.

King, H. K. (2010). Defining customer value as the driver of competitive advantage. *Strategy & Leadership*.

Klassen, R. D., & Whybark, D. C. (1999). The impact of environmental technologies on manufacturing performance. *Academy of Management journal*, 42(6), 599-615.

Lankoski, L. (2010). Linkages between environmental policy and competitiveness. *OECD Environment Working Papers*, (13), 0_1.

Larson, A. L. (2000). Sustainable innovation through an entrepreneurship lens. *Business strategy and the environment*, *9*(5), 304-317.

Leonidou, L. C., Christodoulides, P., & Thwaites, D. (2016). External determinants and financial outcomes

Mao, Y., & Wang, J. (2019). Is green manufacturing expensive? Empirical evidence from China. International Journal of Production Research, 57(23), 7235-7247.

Ndemanga, D. A., & Koffi, E. T. (2009). Ownership structure, industry sector and corporate social responsibility (CSR) practices: The case of Swedish listed companies. *rapport nr.: Master Degree Project 2009: 31*.

OECD. (2011). Towards green growth: A summary for policy makers . Retrieved from https://www.oecd.org/greengrowth/48012345.pdf

OECD. (2015). https://www.oecd.org/environment/outreach/Greening-SMEs-policy-manual-eng.pdf. Retrieved from https://www.oecd.org/environment/outreach/Greening-SMEs-policy-manual-eng.pdf

OECD. (2017). Enhancing the Contributions of SMEs in a Global and Digitalised Economy. Retrieved from https://www.oecd.org/industry/C-MIN-2017-8-EN.pdf

OECD. (2018). Environmental Policy Toolkit for SME Greening in EU Eastern Partnership Countries, OECD Green Growth Studies. (OECD Publishing) Retrieved from http://dx.doi.org/10.1787/9789264293199-en

Palmer, K., Oates, W. E., & Portney, P. R. (1995). Tightening environmental standards: the benefit-cost or the no-cost paradigm?. *Journal of economic perspectives*, *9*(4), 119-132.

Pimenova, P., & Van Der Vorst, R. (2004). The role of support programmes and policies in improving SMEs environmental performance in developed and transition economies. Journal of Cleaner Production, 12(6), 549-559.

Porter, M. E., & Van der Linde, C. (1995). Toward a new conception of the environment-competitiveness relationship. Journal of economic perspectives, 9(4), 97-118.

Reyes-Rodriguez, J. F., Ulhøi, J. P., & Madsen, H. (2013). Managerial attitudes, strategic intent, environmental initiatives and competitive advantage. Journal of Global Strategic Management, 13, 166-177.

Reyes-Rodríguez, J. F., Ulhøi, J. P., & Madsen, H. (2016). Corporate environmental sustainability in Danish SMEs: A longitudinal study of motivators, initiatives, and strategic effects. *Corporate Social Responsibility and Environmental Management*, *23*(4), 193-212.

Riillo, C. A. F. (2017). Beyond the question "Does it pay to be green?": How much green? and when?. Journal of cleaner production, 141, 626-640.

Sáez-Martínez, F. J., Díaz-García, C., & González-Moreno, Á. (2016). Factors promoting environmental responsibility in European SMEs: The effect on performance. Sustainability, 8(9), 898.

Simpson, M., Taylor, N., & Barker, K. (2004). Environmental responsibility in SMEs: does it deliver competitive advantage?. Business strategy and the environment, 13(3), 156-171.

Starčević, D. P., Mijoč, J., & Zrnić, A. (2017). Is it worth going green in Croatia? Empirical evidence from SMEs. *Ekonomski Vjesnik*, *30*(1), 141.

Tang, Z., & Tang, J. (2012). Stakeholder–firm power difference, stakeholders' CSR orientation, and SMEs' environmental performance in China. Journal of Business Venturing, 27(4), 436-455.

The World Bank Group. (2020). SMALL AND MEDIUM ENTERPRISES (SMES) FINANCE Improving SMEs' access to finance and finding innovative solutions to unlock sources of capital. Retrieved from https://www.worldbank.org/en/topic/smefinance

Torugsa, N. A., O'Donohue, W., & Hecker, R. (2012). Capabilities, proactive CSR and financial performance in SMEs: Empirical evidence from an Australian manufacturing industry sector. Journal of business ethics, 109(4), 483-500.

Triguero, A., Moreno-Mondéjar, L., & Davia, M. A. (2013). Drivers of different types of eco-innovation in European SMEs. Ecological economics, 92, 25-33.

UNEP. (2008). Green Jobs: Towards decent work in a sustainable, low-carbon world. Retrieved from https://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/documents/publication/wcms_098504.pdf

UNEP. (2020). Promoting innovation and better business practices. Retrieved from United Nations Environment Programme

Yoo, W., Mayberry, R., Bae, S., Singh, K., He, Q. P., & Lillard Jr, J. W. (2014). A study of effects of multicollinearity in the multivariable analysis. International journal of applied science and technology, 4(5), 9.

Appendix A

Table A1. Summary of quantitative analysis on greening activities and SMEs' performance

	Types of Performance	Performance Variables	Greening Activities Variables	Methodology of Analysis	Sample	Findings
Rodriguez, Ulhoi and Madsen (2016)	Competitive Advantage	Differentiation and Positioning Advantage	Environmental initiatives	OLS Regression	308, 276, 214, and 289 SMEs in Denmark in 1999, 2003, 2007 and 2011 respectively	The effect of environmental initiative is positive but does not in increase over time
Rodriguez, Ulhoi and Madsen (2013)	Competitive Advantage	Differentiation and Positioning Advantage	Environmental initiatives	OLS Regression	300 Danish Manufacturing SMEs in 1999, 2003, 2007 and 2011	Positive and significant effect of environmental initiative on SME's competitive advantage
Dangelico and Pontrandolfo (2015)	Competitive Advantage	Market Performance and Image Performance	Environmental Capabilities and Collaborations	OLS Regression	800 Italian companies with 90 % SMEs	Positive effect of environmental capabilities and collaborations on firm's market and image performance.
Chen, Lai and Wen (2006)	Competitive Advantage	Competitive position and strategy	Green Product and Process Innovation	ANOVA	203 random Taiwanese firms	Positive and significant effect of green product and process innovation on corporate competitive advantage
Aragon-Correa et al. (2008)	Competitive Advantage	Organization's performance rate relative to competitors	Environmental Strategy, Stakeholder Management, Shared Vision Strategic Proactivity	ANOVA	108 SMEs in the automotive repair sector in Southern Spain	SMEs undertake a range of environmental strategies from reactive to proactive and firms with the most proactive practices exhibited a significantly positive financial performance.

(continue)

Table A1. Summary of quantitative analysis on greening activities and SMEs' performance *(continued)*

Study	Types of Performance	Performance Variables	Greening Activities Variables	Methodology of Analysis	Sample	Findings
Ar (2012)	Competitive Advantage	Substitution to competitors, obsolete old product and threat from new competitors	Green Product Innovation	Structural Equation Modeling (SEM)	140 Turkish Manufacturers (SMEs)	Green product innovation significantly positively affects competitive capability
Agan, Acar, and Borodin (2013)	Financial Performance	Long term profit, market share, firm's image, competitive advantage	Environmental Management System, Environmentally friendly Design, Recycling, non-renewable Reduction and waste treatment	Structural equation modeling (SEM)	500 Turkish SMEs	Positive and significant effect of green product and process innovation performance on competitive advantage
Riillo (2017)	Financial Performance	Labor productivity and innovation	Green management	Coarsened Exact Matching (CEM)	Sample of 890 Italian SMEs	Results show that green management and performance have generally a U-shape relationship
Sáez-Martínez, Díaz-García and González-Moreno (2016)	Financial Performance	Sales growth	Corporate Environmental Responsibility: gradual scale of pro-environmental attitudes	OLS Regression	3647 European SMEs under Flash Eurobarometer Survey No. 381	CER leads to higher performance in SMEs.
Gaur, Mukherjee, Gaur and Schmid (2011)	Financial Performance	Return on Assets	Environmental Uncertainty	OLS Regression	Survey data of 565 German SMEs	Negative relationship between environmental uncertainty and firm performance

(continue)

Table A1. Summary of quantitative analysis on greening activities and SMEs' performance *(continued)*

Study	Types of Performance	Performance Variables	Greening Activities Variables	Methodology of Analysis	Sample	Findings
Starčević, Mijoč, and Zrnić (2017)	Financial Performance	Production costs, product and services offering and turnover	Types of Resource Efficiency actions	ANOVA	502 Croatian SMEs	Green undertakers generate higher turnover and lower costs than non-green companies.
Jové-Llopis and Segarra-Blasco (2017)	Financial Performance	Turnover growth	Resource efficiency eco-strategies, breath of strategies and resource efficient investment	Ordered Logit Regression	11336 SMEs from Flash Eurobarometer #426	Undertaking of an eco-strategy is associated with reduced growth in terms of turnover
Ar (2012)	Financial Performance	Sales growth, Market Share and Return on Investment	Green Product Innovation: eco-friendly material, Eco-friendly packaging, recycling, and ecolabeling	Structural Equation Modeling (SEM)	140 Turkish Manufacturers (SMEs)	green product innovation significantly and positively affects firm performance
Torugsa, O'Donohue and Hecker (2012)	Financial Performance	Return on assets and net profits to sales	Proactive CSR in terms of perception of managers	Structural Equation Modeling (SEM)	1388 SMEs operating in Australian manufacturing industry	Positive and significant effect of proactive CSR on firm performance
Leonidou, Christodoulides and Thwaites (2016)	Financial Performance	Profit growth, return on assets, return on investment, sales, sales growth and cash flow	Eco-friendly orientation: relevant function, protection of environment, impact of natural environment on firm, environmental protection for form survival, and firm image	Structural Equation Modeling (SEM)	153 small companies in Cyprus	Underline the critical role of techno-friendly orientation in enhancing the firm's financial performance

(continue)

Table A1. Summary of quantitative analysis on greening activities and SMEs' performance *(continued)*

Study	Types of Performance	Performance Variables	Greening Activities Variables	Methodology of Analysis	Sample	Findings
Arend (2014)	Environmental Performance	CSR Competitive Advantage: whether firm social practices are successful	Green policy completion, green policy commitment, green value goal and green policy goal	OLS regression	193 US small and medium size enterprises	Significant and Positive effect of green policy completion and commitment and insignificant effect of green value and policy goals
Tang and Tang (2012)	Environmental Performance	KLD environmental rating	Stakeholders' CSR orientation	OLS regression	40 SMEs in Northern and Eastern regions of China	Stakeholder's CSR orientation moderates the relationship between stakeholder–firm power difference and SMEs' environmental performance
Hussen and Eagan (2007)	Environmental Performance	Environmental Results in terms of Human Resource and environmental effectiveness	Planning for continuous environmental improvement and process and environmental management	Structural Equation Modeling (SEM)	458 manufacturing SMEs in the United States	Insignificant effect of environmental planning and management on environmental performance

Appendix B

Table B1. SMEs' Greening Actions by Country

Country	Observations	Many Actions	Some Actions	Few Actions	No Action
France	416	50.96%	33.65%	12.74%	2.64%
Belgium	403	47.15%	29.03%	17.12%	6.70%
The Netherlands	413	40.44%	34.62%	18.89%	6.05%
Germany	384	38.28%	36.20%	20.05%	5.47%
Italy	402	39.55%	27.36%	25.37%	7.71%
Denmark	437	35.70%	31.58%	23.11%	9.61%
Ireland	337	56.08%	30.86%	10.68%	2.37%
United Kingdom	325	55.69%	28.00%	14.15%	2.15%
Greece	426	23.00%	24.18%	30.05%	22.77%
Spain	410	49.76%	28.05%	18.05%	4.15%
Portugal	435	56.78%	27.36%	12.64%	3.22%
Finland	427	35.83%	29.51%	23.65%	11.01%
Sweden	405	48.15%	36.05%	13.09%	2.72%
Austria	406	43.84%	31.77%	19.46%	4.93%
Czech Republic	341	34.90%	34.90%	21.41%	8.80%
Estonia	427	5.15%	10.77%	41.69%	42.39%
Hungary	403	25.06%	29.53%	33.00%	12.41%
Latvia	410	24.63%	30.24%	30.98%	14.15%
Lithuania	424	13.92%	25.71%	35.38%	25.00%
Poland	375	30.93%	36.53%	21.60%	10.93%
Slovakia	368	25.54%	28.26%	36.96%	9.24%
Slovenia	428	32.24%	26.40%	27.34%	14.02%
Bulgaria	320	12.50%	23.75%	38.44%	25.31%
Romania	384	11.72%	18.49%	38.02%	31.77%
Turkey	237	46.41%	25.32%	21.10%	7.17%
Croatia	370	34.86%	36.76%	21.08%	7.30%
Norway	237	25.74%	27.00%	28.69%	18.57%
USA	280	57.86%	22.86%	12.86%	6.43%

Source: Flash Eurobarometer survey on ''SMEs, resource efficiency, and green markets'' (no. 456)

Appendix C

Table C1. Correlation Matrix

	Green Actions	Firm Size	Firm Age	Business Sector	Market Type	Country
Green Actions	1.00					
Firm Size	-0.076	1.00				
Firm Age	0.083	-0.037	1.00			
Business Sector	0.110	-0.045	0.055	1.00		
Market Type	-0.109	0.049	-0.029	0.078	1.00	
Country	0.139	-0.032	0.042	0.019	-0.045	1.00

Source: Flash Eurobarometer survey on ‘‘SMEs, resource efficiency, and green markets’’ (no. 456)
Correlation coefficient takes value between 1 to -1 and the value greater than absolute 0.8 suggests severe multicollinearity

Table C2. Variance Inflation Factor

Variable	VIF
Green Actions	1.03
Firm Size	1.01
Firm Age	1.00
Business Sector	1.01
Market Type	1.02
Country	1.02

Source: Flash Eurobarometer survey on ‘‘SMEs, resource efficiency, and green markets’’ (no. 456)
VIF greater than 10 suggests severe multicollinearity

Appendix D

Table D1. Marginal Effect of Binary Logistic Regression

	Turnover	Production Costs	Green Jobs
Green Actions			
No Actions [ref]			
Few Actions	0.048***		0.145***
	(0.018)		(0.016)
Some Actions	0.048***	0.081***	0.226***
	(0.019)	(0.015)	(0.016)
Many Actions	0.067***	0.209***	0.403***
	(0.019)	(0.015)	(0.016)
Firm Size			
Micro [ref]			
Small	0.159***	0.040***	0.021*
	(0.011)	(0.013)	(0.012)
Medium	0.227***	0.112***	0.131***
	(0.014)	(0.015)	(0.015)
Firm Age			
Less than 1 year [ref]			
Between 1 and 4 years	0.164***	0.014	0.021
	(0.017)	(0.021)	(0.019)
Between 4 and 7 years	0.225***	0.007	0.017
	(0.016)	(0.020)	(0.019)
More than 7 years	-0.063	0.173	0.109
	(0.115)	(0.118)	(0.017)
Business Sector			
Manufacturing [ref]			
Retail	0.020	-0.062***	-0.019
	(0.015)	(0.012)	(0.015)
Services	0.022	-0.047***	-0.035**
	(0.015)	(0.016)	(0.015)
Industry	-0.045***	-0.080***	0.037**
	(0.016)	(0.018)	(0.017)
Market Type			
Directly to consumers [ref]			
To other companies	0.069***	0.018	0.031**
	(0.015)	(0.017)	(0.015)
To public administration	-0.004	0.035	0.048**
	(0.042)	(0.047)	(0.044)
Multiple markets	0.087***	0.013	0.048***
	(0.013)	(0.015)	(0.014)
Country Dummies	Yes	Yes	Yes
No. of Observations	10630	8354	10630
Pseudo R-Square	0.059	0.053	0.134

Standard errors in parentheses
* p<.10, ** p<.05, *** p<.01
[ref] Reference Category

Appendix E

Table E1. Binary Logistic Regression. Explanatory variable: *Green Processes Investment*

	Turnover	Production Costs	Green Jobs
Green Investment			
Nothing [ref]			
Less than 1 % of annual turnover	0.267***	0.858***	0.627***
	(0.062)	(0.067)	(0.066)
1-5% of annual turnover	0.465***	1.093***	1.078***
	(0.062)	(0.067)	(0.066)
More than 5% of annual turnover	0.619***	0.849***	1.212***
	(0.081)	(0.085)	(0.086)
Firm Size			
Micro [ref]			
Small	0.595***	0.111**	0.121**
	(0.053)	(0.055)	(0.054)
Medium	0.857***	0.378***	0.536***
	(0.065)	(0.068)	(0.067)
Firm Age			
Less than 1 year [ref]	0.728***	0.021	0.044
Between 1 and 4 years	(0.085)	(0.086)	(0.087)
	0.963***	-0.014	0.037
Between 4 and 7 years	(0.086)	(0.087)	(0.086)
	-0.121	1.012	0.764
More than 7 years	(0.513)	(0.629)	(0.514)
Business Sector			
Manufacturing [ref]			
Retail	0.146**	-0.292***	-0.055
	(0.065)	(0.068)	(0.068)
Services	0.134**	-0.221***	-0.218***
	(0.066)	(0.069)	(0.068)
Industry	-0.141*	-0.352***	0.099
	(0.072)	(0.076)	(0.076)
Market Type			
Directly to consumers [ref]			
To other companies	0.298***	0.052	0.057
	(0.067)	(0.070)	(0.069)
To public administration	-0.223	0.076	0.262
	(0.191)	(0.200)	(0.197)
Multiple markets	0.329***	0.046	0.177***
	(0.060)	(0.063)	(0.062)
Country Dummies	Yes	Yes	Yes
Constant	-1.514***	-0.792***	-1.151***
	(0.137)	(0.140)	(0.138)
No. of Observations	8553	7820	8553
Pseudo R-Square	0.064	0.064	0.115

Standard errors in parentheses
* p<.10, ** p<.05, *** p<.01
[ref] Reference Category

Appendix F

Table F1. Binary Logistic Regression. Explanatory variable: Types of Green Actions

	Turnover	Production Costs	Green Jobs
Types of Green Actions			
Saving water	-0.025	0.080	0.103**
	(0.050)	(0.053)	(0.052)
Saving energy	-0.054	0.393***	0.357***
	(0.052)	(0.057)	(0.055)
Renewable energy	0.072	0.181***	0.576***
	(0.059)	(0.063)	(0.062)
Saving materials	0.034	0.330***	0.133**
	(0.050)	(0.053)	(0.052)
Minimizing waste	0.019	0.098*	0.209***
	(0.052)	(0.057)	(0.055)
Selling scrap	-0.038	0.196***	0.215***
	(0.048)	(0.051)	(0.050)
Recycling	0.124***	0.165***	0.428***
	(0.046)	(0.050)	(0.048)
Sustainable Design	0.178***	0.123**	0.488***
	(0.050)	(0.052)	(0.052)
Firm Size			
Micro [ref]			
Small	0.655***	0.152***	0.071
	(0.047)	(0.053)	(0.050)
Medium	0.945***	0.436***	0.514***
	(0.059)	(0.065)	(0.062)
Firm Age			
Less than 1 year [ref]			
Between 1 and 4 years	0.663***	0.067	0.085
	(0.073)	(0.084)	(0.078)
Between 4 and 7 years	0.942***	0.044	0.076
	(0.074)	(0.083)	(0.077)
More than 7 years	-0.253	0.849	0.535
	(0.474)	(0.589)	(0.478)
Business Sector			
Manufacturing [ref]			
Retail	0.093	-0.249***	-0.059
	(0.059)	(0.066)	(0.063)
Services	0.087	-0.188***	-0.126**
	(0.060)	(0.068)	(0.064)
Industry	-0.189***	-0.317***	0.158**
	(0.066)	(0.073)	(0.070)

Standard errors in parentheses
* p<.10, ** p<.05, *** p<.01
[ref] Reference Category

Table F1. Binary Logistic Regression. Explanatory variable: Types of Green Actions *(continued)*

	Turnover	Production Costs	Green Jobs
Market Type			
Directly to consumers [ref]			
To other companies	0.276***	0.068	0.132**
	(0.059)	(0.068)	(0.063)
To public administration	-0.010	0.116	0.441**
	(0.169)	(0.191)	(0.180)
Multiple markets	0.350***	0.037	0.187***
	(0.054)	(0.061)	(0.057)
Country Dummies	Yes	Yes	Yes
Constant	-1.331***	-1.120***	-2.075***
	(0.133)	(0.146)	(0.149)
No. of Observations	10630	8354	10630
Pseudo R-Square	0.060	0.056	0.143

Standard errors in parentheses
* p<.10, ** p<.05, *** p<.01
[ref] Reference Category