A review paper related to the various variable’s measurements on the relationship between environmental performance and financial performance

Qichun Wu *, Fumitaka Furuoka *, Kiew Ling Pui †
* Asia-Europe Institute, University of Malaya, 50603 Kuala Lumpur, Malaysia
†Faculty of Economics & Administration, University of Malaya, 50603 Kuala Lumpur, Malaysia
E-mail: axliewu.b@gmail.com

Abstract. The present-day environmental concerns have provided an incentive for firms to reduce environmental pollution by the reduction in resource consumption which in turn reduces the carbon emissions and other pollutants. To achieve the stakeholder requirement, the firm needs to improve the environmental management system, utilize environmentally friendly activities and strategies for efficient utilization of materials. Different results (positive, negative, no influence) have been documented in previous articles. This study focuses on the measurement of variables and the result of these papers. An inconsistent result has been found between Corporate Environmental Performance (CEP) and Corporate Financial Performance (CFP) relationship, for a sample of 63 empirical studies. In general, environmental performance is positively related to corporate financial performance. The result indicates the variety of environmental variables influencing the results. It is demonstrating that financial benefits (both accounting-based, market-based and others) are more from environmental management and environmental pollution than environmental disclosure. But there is no obvious evidence to demonstrate different financial variables can lead to different correlations.

1. Introduction
Nowadays air pollution and global environmental problem are major issues all over the world. Firms are making more contribution to reduce its impact on air pollution and global environmental issues [1]. Several studies provide evidence on the relationship between corporate environment performance (CEP) and company’s financial performance (CFP). However, a puzzle remains as to the precise effect of CEP and CFP on the organizations.

The increased environmental concern provides an incentive for the company to reduce environmental pollution through pro-active ways [2,3]. From the resource-based review, companies need to reduce the resources consumption to reduce the carbon emissions and other pollutions, thus increase CFP [4,5,6,7,8 9]. Another way that can improve CEP is to improve the corporate environmental management system and use friendly environmental activities and strategies leading to efficient material utilization [10,11,12]. Different variables have been measured in previous studies. Most of these papers measured financial performance by accounting-based such as return on assets (ROA) [13, 14], return on equity (ROE) [5,14]; market-based such as stock return or Tobin’s Q [15,6,16,17]. There are some studies which use both, accounting-based and market-based variables
The environmental performance measured variables can be categorised into three groups. The first group is the environment pollution caused by the activities of the firm that had effects on the environment [21]. It includes some variables such as carbon emissions and waste [21,22]. As a minimum, in stakeholder theory corporate business has to reduce their environmental pollution to satisfy related stakeholders, at least retain environmental legitimacy [23]. The second group is environmental disclosure, the firm needs to disclose environmental information to interested parties to make decisions. They release the information under voluntary and mandatory rules, both as an annual report and sustainability reports [24]. For example, firms in the world registered under the Carbon Disclosure Project (CDP) is a convenient platform for studying cross-country carbon emission [25]. The third group is environmental management, the corporates improve the management structures and systems to adopt sustainability development [26]. Now firms have access to more approaches and objectives for enhancing the environmental risk management to avoid punishment by environmental protection agency. Such as carbon risk management can mitigate the penalty of firms [27].

Different results (positive, negative, no influence) have been documented in previous articles. We focus on the measurement of variables and the result of these papers. An inconsistent result has been found between Corporate Environmental Performance (CEP) and Corporate Financial Performance (CFP) relationship, for a sample of 63 empirical studies. We analyse whether different variables measured in CEP and CFP can determine empirical outcomes. The result shows that the variable environmental management has a positive influence on corporate financial performance.

The result indicates how various variables influence corporate financial performance. Besides, the results are also influenced by different theories and analysis methods. Some of the results suggest that financial benefits (accounting-based, market-based, and business operational performance) come from environmental management and environmental pollution more than environmental disclosure.

2. Environmental performance and financial performance

2.1. Definition of environmental performance

Corporate environmental performance is taking more attention in the last few decades, but there is not a clear definition. The ISO 14031 states that environmental operational performance as ‘outcomes are benefits from the organizations being performed’ [28]. There is two dimensions of CEP, environmental management performance (EMP) and environmental operational performance (EOP) [29, 30]. Both dimensions are capturing a different aspect of environmental performance [28,31,32]. This paper will use three dimensions to analysis corporate environmental performance. CEP is related to financial elements, environmental costs, resource consumption and allocation for the prevention, reduction and avoidance of environment impact [33].

Firm’s activities influence on the natural environment [20], can be grouped into two categories: input-based measurement (resources consumption and energy input) and output-based measurement (GHG emission and waste) [34].

2.2. Definition of financial performance

Financial performance measures both accounting-based (profit) and market-based (stock prices) [35]. Financial performance is defined as “interaction among an organization’s attributes, actions, and environment based on the economic outcomes” [36]. Financial performance is a multivariate construct [28] that consists of stock liquidity, profit, growth and stock market performance [37]. Most research on the relationship between CEP and CFP had been on profit and stock market performance due to different theoretical effects and empirical evidence across different study contexts [11,38,39,40]. On the other hand, existing research studies in environmental or theoretical concepts are not focused on stock market liquidity and growth [28].

Return on equity (ROE) is a profitability ratio which provides stockholders' evaluation and performance of the market. Return on assets (ROA), Return on investment (ROI), and Return on invested capital (ROIC) not only affects the equity capital but also the borrowing capital through trade
payables and investors. Tobin's \( q-1 \) and the natural logarithm of Tobin's \( q \) is a ratio known as the market price of the firm to the book value of total assets [9,41,42].

3. Different measurement of environmental performance and financial performance

Corporate environmental performance on corporate financial performance has taken more awareness of the researchers during the last three decades. But this construct is difficult to measure. Some studies find that CEP can be composed of two dimensions, called environmental management performance (EMP) connecting to environmental operational performance (EOP) [28]. EMP composed of five sub-dimensions which are environmental policy, objective, processes, organizational structure, and monitoring [29,30]. All these sub-dimensions can be captured in several environmental indicators [28,31,32].

3.1. Different dimensions of Corporate environmental performance

a. Environmental pollution

The important part of environmental pollution is carbon emission and air pollution. Carbon emission releases its trace gas in Earth’s atmosphere. Carbon emissions are the greenhouse gas emissions as a contributor to climate change due to global warming or the greenhouse effect. The industrial revolution began the blazing of carbon (fossil fuels) which has grown the concentration of carbon dioxide (CO2). Their levels in the atmosphere have rapidly increased global warming. Environmental pollution evaluates environmental impacts in terms of physical units and monetary value [43]. It comprises of many variables that can be categorised into two groups as input variables (resource consumption and total energy input) and output variables (GHG emissions and waste) [34].

b. Environmental disclosure

According to Ministry of the Environment Government of Japan (June 2007, p.7), ‘environmental disclosure is, regardless of its name or disclosure media, to promote communication of organizations, to fulfil its accountability regarding environmental efforts in their activities, and to provide useful information to decision making of interested parties.’

In the previous studies, most of the variables utilized as environmental disclosure can be summarised as information releases regarding toxic emissions, environmental awards, environmental accidents and crises, and environmental investment announcement [43]. Azar Shahgholian (2019) introduced a new variable environmental disclosure quality. The author observed that environmental disclosure quality is more important than the toxic emissions [34]. Besides, legitimacy theory, stakeholder theory and voluntary theory are the most popular theories that have been used in prior studies related to social and environmental disclosure [44,45,46,47]. Carbon disclosure belongs to environmental disclosure. Legitimacy theory claims that carbon disclosure is a function of political, social and stakeholder pressures. In response to public pressure, firms with poor carbon performance need stronger incentives in an attempt to disclose more environmental information to the public [6]. Carbon disclosure is a sub-set of environmental disclosure [48], this information that related companies’ past and forecast carbon emission level, the carbon emission level will associate with the firm’s risk and opportunities, and the firm’s action to manage this risk in the past or future [49,50].

Environmental disclosure can significantly enhance a firm’s legitimacy. Organizations can adopt environmental disclosure to make the changes in performance and the firm’s image [51]. The empirical findings of the previous study show that carbon disclosure and performance are different from the carbon study findings on environmental disclosure. The idea of carbon disclosure is a wider discourse than environmental and sustainability disclosure [6]. A changing climate creates pervasive risks; thus, a comprehensive strategy and actions will need to be adopted by a firm to deal with climate change. Even though all firms emit carbon, but many firms do not have environmental issues. On the one hand, most environmental disclosure, for example, toxic emissions and chemical waste are nondiscretionary, whereas carbon disclosure is voluntary. Hence, there is uncertainty about the nature of the relationship between carbon information and market reactions.
c. Environmental management
Environmental management is a new green technology or strategy that can improve the firm’s financial performance. Such as, implementing a new efficient system to improve the green management of the production process. Environmental and research expenditure to reduce environmental-related risks. Regulatory risk is the risk of a change of policies and regulations that are likely to exert a significant effect on the financial performance and capital cost of a firm through compliance costs and/or trading emission credits. Risk is directly associated with climate change, such as drought, floods, storms and sea-levels rise. And last, corporate carbon risk is the risk of market competition due to environmental disclosure [52].

3.2. Dissimilarity dimensions of financial performance
This study from four dimensions to illustrate the corporate financial performance, mentioned as follows:

a. Accounting-based financial performance
Accounting-based financial performance is based on the financial statement and reflect the firm’s valuation from the statement of financial position

b. Market-based financial performance
Market-based financial performance reflects the valuation by investors from the fluctuation in market value.

c. Firm cost
The firm cost has two aspects, first is the cost of the products [53], and the other one is the cost of financial debts [54,55].

d. Business operation performance
Business operation performance is evaluated from the process of the firm business operation, to reflect how well the firm’s business is functioning.

4. Types of variables

4.1. Environmental performance variables measurement
This section describes the types of CEP measures employed by previous studies. Corporate environmental performance includes three dimensions, as tabulated in table 1: environmental pollution, environmental disclosure and environmental management. Environmental pollution includes GHG emission reduction [4,5,14,18], environmental rating score [18,22,56] and pollutant release [57,58]. Researchers have used environmental disclosure for the measurement of CEP. Environmental disclosure includes carbon emission disclosure [13,59] and others measure using environmental disclosure score [18,60] for specific measurement. Other researchers use third dimension environmental management to measure corporate environmental performance. Environmental management is when companies use environmental strategies and practices to improve the firm’s environmental performance. Such as environmental management [61,62,63], CSR concern [64] and firm register in ISO 14001 certificate [19,30,65].

| Environmental pollution | GHG emission reduction |
|-------------------------|------------------------|
|                         | Environmental rating score |
|                         | Pollutant release |
| Environmental disclosure | Environmental disclosure score |
|                         | Carbon emission disclosure |
| Environmental management | Environmental management |
|                         | CSR concern |
|                         | ISO 14001 certificate |
4.2. Financial performance variables measurement

This part explains the different variables of financial performances from a different perspective, namely: accounting-based financial performance, market-based financial performance, cost and business operational performance as tabulated in Table 2.

There are some financial indicator to measure accounting-based financial performance, return on assets (ROA) [8,60,65], return on equity (ROE) [66,67], return on sales (ROS) [5,68], return on investment (ROI) [69,70,71] and earning [58,72,73].

![Table 2. Financial variables measurement](image)

| Accounting based financial performance | ROA | ROE | ROS | ROI | Earning |
|---------------------------------------|-----|-----|-----|-----|---------|
| Cost                                  | Production cost | Financial debt cost |
| Market based financial performance    | Tobin’s Q | Market value | Market value added |
| Business operation performance        | Financial risk | Future cash flow | Capital turnover | Sales growth |

Market-based financial performance is measured using stock exchange price. Stock market price have been directly used by researchers like market value [60] and market values added [59]. While some other researches use stock price by company replacement costs to calculate Tobin’s Q [9,30, 61]. In contrast, financial performance measures the cost of the firm. Financial performance includes production cost [53,74] and financial debt cost [54,55]. And other variables associated with business operation performance are financial risk [22], future cash flow [75], capital turnover [8]and sales growth [10,71].

5. Discussion and Conclusion

After highlighting the corporate environmental performance and corporate financial performance, there are different categories of measurement of corporate environmental performance and corporate financial performance as shown in Fig.1. In Fig.1, CEP and CFP categories are combined from 63 empirical studies and analysed the correlation through vote counting.

There are 110 correlations of different environmental performance on financial performance. There are 44 correlations (40%) using environmental pollution, 18 correlations (16%) using environmental disclosure and 48 correlations (44%) using environmental management. The four main financial categories are 61 correlations (56%) using accounting-based performance, 11 correlations (10%) using firm cost, 29 correlations (26%) using market-based financial performance and 9 correlations (8%) using business operation performance. For the measurement of environmental performance, the majority of researchers are using environmental performance and corporate environmental management, only 16% of relationship using environmental disclosure.

According to the different combinations can be inferred like under the environmental pollution measure, there are 22 positive results (50%), 12 negative results (27%), 9 non-relationship results and 1 U-shape result (2%). Under environmental disclosure measure respective, 7 positive results (39%), 3 negative result (17%), 8 non-relationship (44%). In the case of environmental management measures, 36 positive result (75%), 4 negative results (8%), 7 non-relationship (15%) and 1 U-shape (2%). This study demonstrates, using the firm’s environmental management variable has the highest relative frequencies of positive results. But there are no obvious correlations for different corporate
financial relationship. It reveals that firms need to take more consideration to improve environmental management tools or skills, these have a great impact on firm financial performance. Sustainability development and environmentally friendly production will more and more important in future company governance.

The limitation of this research is that the relationship between CEP and CFP may be influenced if analysed from a different database. These articles from a different area, from developed and developing countries, and different economics context may also influence the relationship.

Figure 1. The relationship between Corporate Financial Performance and Corporate Environmental Performance

References
[1] Molina-Azorin, J. F., & Fetters, M. D. (2018). In This Issue. Journal of Mixed Methods Research, 12(3), 251–253. doi:10.1177/15586898188781885
[2] Porter, M. E., & Reinhardt, F. L. (2007). A strategic approach to climate. Harvard Business Review, 85(10), 22-26.
[3] Ki-Hoon Lee, Byung Min. Green R&D for eco-innovation and its impact on carbon emissions and firm performance. Journal of Cleaner Production 108 (2015) 534-542.
[4] Carmen Fernandez-Cuesta, Paula Castro, María T. Tascon, Francisco J. Castano, The effect of environmental performance on financial debt. European evidence, Journal of Cleaner Production 207 (2019) 379-390
[5] Fortune Ganda & Khazamula Samson Milondzo (2018). The Impact of Carbon Emissions on Corporate Financial Performance: Evidence from the South African Firms. Sustainability 2018, 10, 2398; doi:10.3390/su10072398
[6] Yu He, Qingliang Tang & Kaitian Wang (2017): Carbon performance versus financial performance, China Journal of Accounting Studies, DOI: 10.1080/21697213.2016.1251768
[7] Isabel Gallego-Alvarez, Liliane Segura, Jennifer Martinez-Ferrero. Carbon emission reduction: the impact on the financial and operational performance of international companies. Journal of Cleaner Production 103 (2015) 149-159.
[8] Hidemichi Fujii and Kazuyuki Iwata and Shinji Kaneko and Shunsuke Managi. Corporate environmental and economic performances of Japanese manufacturing firms: Empirical study for sustainable development. Munich Personal RePEc Archive (2012).
[9] Hiroki Iwata, Keisuke Okada. How does environmental performance affect financial performance? Evidence from Japanese manufacturing firm. Ecological Economics 70 (2011) 1691–1700.
[10] Menguc B, Ozanne LK. 2005. Challenges of the “green imperative”: a natural resource-based approach to the environmental orientation–business performance relationship. J. Bus. Res.
58(4):430–38
[11] Marc Orlitzky, Frank L. Schmidt, Sara L. Rynes.(2003). Corporate Social and Financial Performance: A Meta- analysis. Organization Studies.24(3): 403–441
[12] Lee, K.-H., Min, B., 2014. Globalization and carbon constrained global economy: a fad or a trend? J. Asia-Pacific Bus. 15 (2), 105-121
[13] Zahra Borghei, Philomena Leung & James Guthrie. Voluntary greenhouse gas emission disclosure impacts on accounting-based performance: Australian evidence. Australasian Journal of Environmental Management (2018).
[14] Matthias Damert, Arijit Paul, Rupert J. Baumgartner. Exploring the determinants and long-term performance outcomes of corporate carbon strategies. Journal of Cleaner Production 160 (2017) 123-138.
[15] Feng Shen, Yunwen Ma2, Run Wang, Ningning Pan, Zhiyi Meng, (2019)Does environmental performance affect financial performance? Evidence from Chinese listed companies in heavily polluting industries, Quality& Quantity.
[16] Gilley KM, Worrell DL, Davidson WN 3rd, El-Jelly A. 2000. Corporate environmental initiatives and antic- ipated firm performance: the differential effects of process-driven versus product-driven greening initia- tives. J. Manag. 26(6):1199–216
[17] Li Chang, Wenjing Li and Xiaoyan Lu. Government Engagement, Environmental Policy, and Environmental Performance: Evidence from the Most Polluting Chinese Listed Firms. Bus. Strat. Env. 24, 1–19 (2015). DOI: 10.1002/bse.1802
[18] Mikael Petitjean, Eco-friendly policies and financial performance:Was the financial crisis a game changer for large US companies? Energy Economics 80 (2019) 502–511.
[19] Miroshnychenko I, Barontini R, Testa F. 2017. Green practices and financial performance: a global outlook. J. Clean. Prod. 147:340–51
[20] Wall, B. T., Stephens, F. B., Constantin-Teodosiu, D., Marimuthu, K., Macdonald, I. A., & Greenhaff, P. L. (2011). Chronic oral ingestion ofl-carnitine and carbohydrate increases muscle carnitine content and alters muscle fuel metabolism during exercise in humans. The Journal of Physiology, 589(4), 963–973. doi:10.1113/jphysiol.2010.201343
[21] CÓRDOVA, C. R., ZORIO-GRIMA, A., & GARCÍA- BENAU, M. (2018). NUEVAS FORMAS DE REPORTING CORPORATIVO: INFORMACIÓN SOBRE LA HUELLA DE CARBONO EN ESPAÑA. Revista de Administração de Empresas, 58(6), 537–550. doi:10.1590/s0034-759020180603
[22] Yasir Shahab, Collins G. Ntim, Yungang Chen, Farid Ullah, Hai- Xia Li1, Zhiwei Ye, Chief executive officer attributes, sustainable performance, environmental performance, and environmental reporting: New insights from upper echelons perspective. Bus Strat Env. 2019;1–16. DOI: 10.1002/bse.2345
[23] Qin, Y., Harrison, J., & Chen, L. (2019). A framework for the practice of corporate environmental responsibility in China. Journal of Cleaner Production, 235, 426–452. doi:10.1016/j.jclepro.2019.06.245
[24] Frost, G., ‘The Introduction of Mandatory Environmental Reporting Guidelines: Australian Evidence’, Abacus, Vol. 43, No. 2, 2007.
[25] Unerman, J., Chapman, C., 2014. Academic contributions to enhancing accounting for sustainable development. Acc. Organ. Soc. 39 (6), 385–394.
[26] Schultze, W., & Trommer, R. (2012). The concept of environmental performance and its measurement in empirical studies. Journal of Management Control, 22, 375-412.
[27] Peter M. Clarkson, Yue Li, Matthew Pinnuck & Gordon D. Richardson (2015) The Valuation Relevance of Greenhouse Gas Emissions under the European Union Carbon Emissions Trading Scheme, European Accounting Review, 24:3, 551-580, DOI: 10.1080/09638180.2014.927782
[28] Christoph Trumpp and Thomas Guenther. (2015). Too Little or too much? Exploring U-shaped Relationships between Corporate Environmental Performance and Corporate Financial
Performance. Bus. Strat. Env. (2015). DOI: 10.1002/bse.1900

[29] Milne, M. J., & Gray, R. (2012). W(h)ither Ecology? The Triple Bottom Line, the Global Reporting Initiative, and Corporate Sustainability Reporting. Journal of Business Ethics, 118(1), 13–29. doi:10.1007/s10551-012-1543-8

[30] Wahba H. 2008. Does the market value corporate environmental responsibility? An empirical examination. Corp. Soc. Responsib. Environ. Manag. 15(2):89–99.

[31] Xie, S., & Hayase, K. (2007). Corporate environmental performance evaluation: A measurement model and a new concept. Business Strategy and the Environment, 16, 148–168.

[32] Clemens, B., & Bakstran, L. (2010). A framework of theoretical lenses and strategic purposes to describe relationships among firm environmental strategy, financial performance, and environmental performance. Management Research Review, 33, 393–405.

[33] Voicu D. Dragomir. (2018) How do we measure corporate environmental performance? A critical review. Journal of Cleaner Production 196 (2018) 1124-1157.

[34] Azar Shahgholian. Unpacking the relationship between environmental profile and financial profile; literature review toward methodological best practice. Journal of Cleaner Production 233 (2019) 181-196.

[35] Dietrich Earnhart. (2018) The Effect of Corporate Environmental Performance on Corporate Financial Performance. Annu. Rev. Resour. Econ. 2018. 10:425–44.

[36] Combs, J. G., Russell Crook, T., & Shook, C. L. (2005). The dimensionality of organizational performance and its implications for strategic management research. In

[37] D. J. Ketchen (Ed.), Research methodology in strategy and management (pp. 259–286). Amsterdam: Elsevier.

[38] Hamann, P. M., Schiemann, F., Bellora, L., & Guenther, T. W. (2013). Exploring the dimensions of organizational performance: A construct validity study. Organizational Research Methods, 16, 67–87.

[39] Delmas M, Hoffmann VH, Kuss M. 2011. Under the tip of the iceberg: absorptive capacity, environmental strategy, and competitive advantage. Bus. Soc. 50(1):116–54

[40] Dixon-Fowler, H.R., Slater, D.J., Johnson, J.L., Ellstrand, A.E., Romi, A.M., 2013. Beyond ‘does it pay to be green?’ A meta-analysis of moderators of the CEP–CFP relationship. J. Bus. Ethics 112(2), 353–366.

[41] Endrikat, J., Guenther, E., & Hoppe, H. (2014). Making sense of conflicting empirical findings: A meta-analytic review of the relationship between corporate environmental and financial performance. European Management Journal, 32(5), 735–751.

[42] Konar S, Cohen MA. 2001. Does the market value environmental performance? Rev. Econ. Stat. 83(2):281–89

[43] Hirsch, B.T., Seaks, T.G., 1993. Functional form in regression models of Tobin's q. Review of Economics and Statistics 75 (2), 381–385.

[44] Elisabeth Albertini. (2013). Does Environmental Management Improve Financial Performance? A Meta- Analytical Review. Organization & Environment 26(4) 431 –457. DOI: 10.1177/1086026613510301

[45] Bouten, L., Everaert, P., Roberts, R.W., 2012. How a two-step approach discloses different determinants of voluntary social and environmental reporting. J. Business Finance Account. 39 (5–6), 567–605.

[46] Stephen Brammer, Chris Brooks, and Stephen Pavelin. (2006). Corporate Social Performance and Stock Returns: UK Evidence from Disaggregate Measures. Financial Management • Autumn 2006 • pages 97 - 116

[47] Deegan, C. (2002). Introduction: The legitimizing effect of social and environmental disclosures: A theoretical foundation. Accounting, Auditing & Accountability Journal, 15(3), 282–311.

[48] Owen, D. (2008). Chronicles of wasted time? A personal reflection on the current state of, and
future prospects for social and environmental accounting research. Accounting, Auditing & Accountability Journal, 21(2), 240–267.

[49] Andrew, J., Cortese, C., 2011. Accounting for climate change and the self-regulation of carbon disclosures. Account. Forum 35 (3), 130–138.

[50] Najah, M. M. S. (2012). Carbon risk management, carbon disclosure and stock market effects: An international perspective. University of Southern Queensland.

[51] Noor Raida Abd Rahman, Siti Zaleha Abdul Rasid, Rohaida Basiruddin. Exploring the relationship between carbon performance, carbon reporting and firm performance: A conceptual paper. Procedia - Social Social and Behavioral Sciences 164 (2014) 118 – 125

[52] Patten, D.M., 1992. Intra-industry environmental disclosures in response to the Alaskan oil spill: a note on legitimacy theory. Acc. Organ. Soc. 17 (5), 471–475.

[53] Labatt, S., & White, R. R. (2007). Carbon finance: The financial implications of climate change. Hoboken, NJ: Wiley.

[54] Pereira-Moliner J, Font X, Tarí J, Molina-Azorin J, Lopez-Gamero M, Pertusa-Ortega E. 2015. The Holy Grail: environmental management, competitive advantage and business performance in the Spanish hotel industry. Int. J. Contemp. Hosp. Manag. 27(5):714–38

[55] Zhifang Zhou, Tao Zhang, Kang Wen, Huixiang Zeng, Xiaohong Chen. (2018) Carbon risk, cost of debt financing and the moderation effect of media attention: Evidence from Chinese companies operating in high- carbon industries. Bus Strat Env. 2018;1 – 14.DOI: 10.1002/bse.2056

[56] Juhyun Jung, Kathleen Herbohn, Peter Clarkson. Carbon Risk, Carbon Risk Awareness and the Cost of Debt Financing. J Bus Ethics (2016). DOI 10.1007/s10551-016-3207-6

[57] Marilyn T. Lucas and Thomas G. Noordewier, (2016) Environmental Management Practices and Firm Financial Performance: The Moderating Effect of Industry Pollution-Related Factors, Intern. Journal of Production Economics.

[58] Noor Muhammad, Frank Scrimgeour, Krishna Redd, Sazali Abidin. The relationship between environmental performance and financial performance in periods of growth and contraction: evidence from Australian publicly listed companies. Journal of Cleaner Production 102 (2015) 324-332.

[59] Cordeiro JJ, Sarkis J. 1997. Environmental proactivism and firm performance: evidence from security analyst earnings forecasts. Bus. Strategy Environ. 6(2):104–14

[60] Fortune Ganda. The effect of carbon performance on corporate financial performance in a growing economy. (2016) SOCIAL RESPONSIBILITY JOURNAL. LARELLE CHAPPLE, PETER M. CLARKSON AND DANIEL L. GOLD. The Cost of Carbon: Capital Market Effects of the Proposed Emission Trading Scheme (ETS) ABACUS, Vol. 49, No. 1, 2013 doi: 10.1111/abac.12006

[61] Yuriko Nakao,Akihiro Amano, Kanichiro Matsumura, Kiminori Genba and Makiko Nakano. Relationship Between Environmental Performance and Financial Performance: An Empirical Analysis of Japanese Corporations. Bus. Strat. Env. 16, 106–118 (2007) DOI: 10.1002/bse.476

[62] González-Benito J, González-Benito O.2005. Environmental proactivity and business performance: an empirical analysis. Omega 33(1):1–15

[63] Carmona-Moreno E, C’espedes-Lorente J, De Burgos- Jiménez J. 2004. Environmental strategies in Spanish hotels: contextual factors and performance. Serv. Ind. J. 24(3):101–30

[64] Isabel- Maria García- Sánchez & Jennifer Martínez- Ferrero (2018), Chief executive officer ability, corporate social responsibility, and financial performance: The moderating role of the environment, Bus Strat Env. 2018;1– 14. DOI: 10.1002/bse.2263

[65] Heras-Saizarbitoria I,Molina-Azor in JF,DickGPM.2011. ISO 14001 certification and financial performance: selection-effect versus treatment-effect. J. Clean. Prod. 19(1):1–12

[66] Zeng S, Meng X, Yin H, Tam C, Sun L. 2010. Impact of cleaner production on business performance. J. Clean. Prod. 18(10):975–83
[67] Dietrich Earnhart & Lubomir Lizal. Effect of Pollution Control on Corporate Financial Performance in a Transition Economy. Eur. Env. 17, 247–266 (2007). DOI: 10.1002/eet.447

[68] Mengying Feng, Wantao Yu, Xingyu Wang, CheeYew Wong, Maozeng Xu, Zhi Xiao, Green supply chain management and financial performance: The mediating roles of operational and environmental performance. Bus Strat Env. 2018; 1–14. DOI: 10.1002/bse.2033

[69] Yavuz Agan, Cemil Kuzey, Mehmet Fatih Acar, Atif Açıkgoz. The relationships between corporate social responsibility, environmental supplier development, and firm performance. Journal of Cleaner Production (2014), http://dx.doi.org/10.1016/j.jclepro.2014.08.090

[70] Arag´on-Correa J, Rubio-Lopez E. 2007. Proactive corporate environmental strategies: myths and misunderstandings. Long Range Plan. 40(3):357–81

[71] Montabon F, Sroufe R, Narasimhan R. 2007. An examination of corporate reporting, environmental management practices and firm performance. J. Oper. Manag. 25(5):998–1014

[72] De Burgos Jime´nez, J., &Ce´spedes Lorente, J. J. (2001). Environmental performance as an operation objective. International Journal of Operations and Production Management, 21(12), 553–572.

[73] Judge WQ, Douglas TJ. 1998. Performance implications of incorporating natural environmental issues into the strategic planning process: an empirical assessment. J. Manag. Stud. 35(2):241–62

[74] Sharma S, Vredenburg H. 1998. Proactive corporate environmental strategy and the development of competitively valuable organizational capabilities. Strateg. Manag. J. 10(2):729–53

[75] Marlene Plumlee, Darrell Brown, Rachel M. Hayes, R. Scott Marshall. Voluntary environmental disclosure quality and firm value: Further evidence. J. Account. Public Policy (2015),