Do Environmental Management Systems Environmentally and Financially Pay Off? – A Panel Data Analysis of 600 European Organizations

Maria Huber  
*Ludwig-Maximilians-University Munich, Germany*, Mar.Huber@campus.lmu.de

Anne Ixmeier  
*Ludwig-Maximilians-University Munich, Germany*, ixmeier@lmu.de

Follow this and additional works at: [https://aisel.aisnet.org/sprouts_proceedings_siggreen_2021](https://aisel.aisnet.org/sprouts_proceedings_siggreen_2021)

**Recommended Citation**  
[https://aisel.aisnet.org/sprouts_proceedings_siggreen_2021/3](https://aisel.aisnet.org/sprouts_proceedings_siggreen_2021/3)

This material is brought to you by the Proceedings of SIG GREEN Workshop at AIS Electronic Library (AISeL). It has been accepted for inclusion in 2021 by an authorized administrator of AIS Electronic Library (AISeL). For more information, please contact elibrary@aisnet.org.
Do Environmental Management Systems Environmentally and Financially Pay Off? – A Panel Data Analysis of 600 European Organizations

Maria Huber  
Ludwig-Maximilians-University Munich  
Mar.Huber@campus.lmu.de

Anne Ixmeier  
Ludwig-Maximilians-University Munich  
ixmeier@lmu.de

Abstract

Companies are increasingly adopting so-called Environmental Management Systems (EMS), which can trigger and support them to act more sustainably. However, there are incomplete and inconsistent findings regarding the complex relations between EMS, environmental performance, and financial performance. Therefore, we analyze these relations for the STOXX600 companies by applying panel data regression. It is likely that companies with a certified EMS experience higher environmental performance and financial performance in the future. Moreover, it is expected that the latter effect is due to a direct positive effect of EMS on financial performance as well as a mediation effect through environmental performance. In the light of companies’ role in combating climate change, this study contributes towards a more comprehensive and conclusive understanding regarding the impact and benefits of environmental performance and EMS.

Keywords: Environmental Sustainability, Green IS, Environmental Management System, Environmental Performance, Financial Performance, Panel Data Analysis
Introduction

According to the Carbon Disclosure Project, only 100 companies are responsible for 71% of global greenhouse gas emissions (Griffin 2017), which underscores the important role companies play in combating climate change.

It has been argued that the information systems (IS) discipline has the responsibility and the opportunity to make a contribution to resolving these urgent environmental sustainability issues (Watson et al. 2010; Vom Brocke et al. 2013). Therefore, green information systems (Green IS) – as a subfield of the IS discipline – investigate how technology-based systems can support environmental sustainability (Loeser et al. 2017; Watson et al. 2010). More specifically, Green IS integrate “[…] people, processes, software and information technologies to support individual, organizational, or societal goals” (Watson et al. 2010, p. 24). In general, the effects of Green IS can be summarized in three categories (Kranz et al. 2015; Henkel and Kranz 2018):

1. Firstly, information technology (IT) itself can contribute to environmental sustainability by reducing its negative environmental impacts.
2. Secondly, enabling effects of Green IS in other sectors (e.g., logistics, manufacturing) can help societies and organizations operate more eco-efficiently by enabling more sustainable business operations.
3. And lastly, systemic effects of Green IS can change economic structures and behaviors in the medium- and long-term towards more eco-sustainable practices (i.e., eco-effectiveness).

Overall, a major aim of Green IS is to mitigate environmental impacts by helping organizations and individuals make more environmentally sustainable decisions (Loeser et al. 2017) and supporting and triggering sustainable business processes and work practices (Watson et al. 2010; Loeser et al. 2017).

To minimize the influence of their activities on the environment, numerous companies have already adopted Environmental Management Systems (EMS) (ISO 2019; Sroufe 2003). An EMS is a "formal system and database which integrates procedures and processes for the training of personnel, monitoring, summarizing, and reporting of specialized environmental performance information to internal and external stakeholders" (Melnyk et al. 2003, p. 332). Therefore, EMS can trigger and support an organization in acting more sustainably.

However, there are inconclusive or contradictory findings on the complex relations between EMS, environmental performance, and financial performance. For instance, Melnyk et al. (2003) found that a certified EMS strongly influences the impact of environmental activities on corporate performance. Voinea et al. (2020) investigated the relation between EMS, environmental and financial performance in Brazil. Their conclusion is a negative effect of environmental performance on financial performance and a negative effect of above-average EMS comprehensiveness on financial performance.

Therefore, our research provides a better understanding of the contribution of EMS to organizations' performance and ultimately to their lower environmental impact.

Theory and Hypotheses

Multiple perspectives and theories have been proposed in the economic literature to capture the relationship between environmental and financial performance (e.g., Iraldo et al. 2009). In this discussion, the potential conflict and trade-off between a firm's competitiveness and its environmental performance has often been stressed, as environmental investments were seen as additional costs (Walley and Whitehead 1994). On the other hand, it has been argued that improved environmental performance can be a source of competitive advantage (Porter 1991; Porter and van der Linde 1995). Based on these positions two specifications of the relationships were proposed: The “traditionalist” view and the “revisionist” view. The latter assumes a positive relationship between environmental and financial performance implying that an improvement in environmental performance improves financial performance.
The majority of studies seems to find a positive relation between EMS certification and environmental performance (e.g., Melnyk et al. 2003). However, there has also been contrasting empirical evidence (e.g., Barla 2007). Nevertheless, according to the ISO 14001 standard, the results of using an EMS are enhancing environmental performance, fulfilling compliance obligations, and achieving environmental objectives (ISO 2015). Therefore, we hypothesize the positive relation between EMS and environmental performance to be a standard expectation.

**H1:** The implementation and certification of an EMS is positively related to environmental performance.

Furthermore, we investigate the effect on the different dimensions of environmental performance.

While several studies have shown no significant relation between environmental performance and profitability, other studies have shown a positive link (see e.g., Russo and Fouts 1997). Theoretically, improved environmental performance can be a source of competitive advantage due to more efficient processes, improved productivity, lower costs, and new market opportunities (Porter 1991; Porter and van der Linde 1995). Klassen and McLaughlin (1996) suggest that improved environmental performance could improve firms' financial performance through cost savings and market gains. Based on these arguments, we expect the effect of environmental performance on financial performance to be positive.

**H2:** Environmental performance is positively related to financial performance.

To further analyze the relationship between environmental and financial performance, we investigate the moderating effect of EMS on this relation. Schaltegger and Synnestvedt (2002) argue that not only the level of environmental performance, but primarily the kind of environmental management affects the economic outcome. According to them, “[...] to understand and measure the links between environmental protection and economic success it is crucial to analyse the quality of environmental management with respect to the range of possibilities for improving the environmental performance in the most economic manner” (Schaltegger and Synnestvedt 2002, p. 343). Accordingly, we argue that those companies with a certified EMS have an information advantage that can be leveraged to identify, evaluate, implement, and adjust opportunities to improve their environmental performance in a more economical way. Hence, we expect the relationship between environmental and financial performance to be stronger for companies with a certified EMS.

**H3:** The implementation and certification of an EMS moderates the relationship between environmental performance and financial performance.

From a theoretical perspective, EMS certification as an intangible resource (Delmas 2001) can – besides the improvement of environmental performance – provide economic and competitive opportunities through operational efficiencies (Porter and van der Linde 1995; Delmas 2001). Many papers highlight the economic benefits of EMS certification (Boiral et al. 2018). More specifically, financial effects can be broad including direct effects such cost reductions (e.g., Lo et al. 2012) and indirect effects such as marketing advantages and enhanced corporate reputation (see Boiral et al. 2018), increased customer satisfaction and customer loyalty (e.g., Feng and Wang 2016). Based on these two types of effects, we formulate two hypotheses:

**H4:** The implementation and certification of an EMS is positively related to financial performance.

**H5:** Environmental performance mediates the relationship between EMS certification and financial performance.

**Method and Data**

Our empirical analysis employs panel data regression. For that, we collect panel data of the STOXX600 companies from 2013 to 2018 using Refinitiv Eikon which contains the databases Refinitiv Datastream, Refinitiv Worldscope Fundamentals and ESG.

Refinitiv offers longitudinal data on more than 500 environmental, social, and governance (ESG) measures for 9,000 companies globally, with a history going back to 2002 (Refinitiv 2021). Furthermore, Refinitiv
summarizes these ESG measures into scores to assess firms’ environmental, governance, and social performance. Thus, we measure companies’ environmental performance with the environmental pillar score (Dal Maso 2020; Hartmann and Uhlenbruck 2015) which “measures a company’s impact on living and non-living natural systems, including the air, land and water, as well as complete ecosystems. It reflects how well a company uses best management practices to avoid environmental risks and capitalize on environmental opportunities in order to generate long term shareholder value” (Refinitiv Eikon 2021). This score includes the three sub-dimensions emission reduction, environmental innovation, and resource use, for each of which scores are available. These scores are used in the analysis to investigate the relationships on a more detailed level.

The dependent variable in our analysis is financial performance, reflected by Tobin’s q. Tobin’s q measures a firm’s market value relative to the replacement costs of its assets (Lindenberg and Ross 1981). For this analysis, we rely on Chung and Pruitt’s (1994) formula to approximate Tobin’s q:

\[ Tobin's \ q = \frac{MVE + PS + DEBT}{TA} \]

with:

- MVE: Product of a firm’s closing share price at the end of the year and the number of common stock shares outstanding;
- PS: Liquidating value of the firm’s outstanding preferred stock;
- DEBT: Value of current liabilities net of current assets, plus the book value of inventories and long-term debt;
- TA: Book value of total assets (Chung and Pruitt 1994; Bharadwaj et al. 1999).

Based on the data point "ISO 14000 or EMS” which is related to the question: "Does the company claim to have an ISO 14000 or EMS certification?", we construct a dummy variable that takes the value “1” if the company has a certified EMS and “0” otherwise. As per this definition, indeed, the usage of IT in this regard is not necessarily encompassed and measured. However, an integral part of an EMS is the management of environmental information (see the environmental systems support framework) and so-called Environmental Management Information Systems (EMIS) – that encompass IT – attempt to support and simplify this task (El-Gayar and Fritz 2006; Rikhardsson 2001). Thus, EMIS support and exist in relation to a company-wide EMS (El-Gayar and Fritz 2006).

As control variables, we use industry, company size, financial risk, and ISO9000 implementation.

**Contribution**

The study contributes towards a clarification of the types of relations, effect sizes, and directions between EMS, environmental performance, and financial performance – following the suggestions of Melnyk et al. (2003) to further investigate the direct and indirect relationships between EMS and performance. A more comprehensive and conclusive understanding of these relationships could clarify the impact and benefits of EMS and thus be crucial to realizing the potential of such systems. The results are expected to outline opportunities and implications of reduced environmental impacts for organizational and societal stakeholders as well as further research.
References


