

IN SEARCH OF BEING GREEN: DO FIRM-SPECIFIC OR INDUSTRY-SPECIFIC FACTORS DRIVE THE ADOPTION OF ISO 14001 CERTIFICATION?

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ABSTRACT

The purpose of this study aims to depict the impacts of the firm-specific and industry-specific factors on the adoption of voluntary environmental program (ISO 14001). The data set is composed of 331 firm-year observing points from the sampled publicly traded firms in Taiwan during the period from 2001 to 2008. Empirical results suggest that firm-specific factors including the degree of internationalization, the experience of ISO 9000 certification and the fulfillment of corporate social responsibility have positive impacts on the adoption of ISO 14001 certification. However, we find that industry-specific factors such as industry pressure and industry uncertainty do not have significant influence on the adoption of ISO 14001 certification.

Keywords: Green Strategy, Voluntary Environmental Program, Corporate Social Responsibility, ISO Certification

INTRODUCTION

Previous studies [11][13][24,p.68][25] have paid more attention to the relationship between firm's green management and performance since the seminal paper of [4], relatively few following in-depth studies have been conducted to generate a firm's switch of capital allocation from being expert in manufacturing to being green with association of the former. And, many people appeal to the world continually to revise economic-based "profit-maximization-only" objectives by corporate social responsibility in advance during the past several decades [7][8][26]. Specifically, beyond regulations of governments, voluntary environmental program (VEP hereafter) adoption such as ISO 14001 certification, has become one of the most important strategic decisions among electronic companies in Taiwan.

There are several viewpoints toward VEP adoption. One is from the speculation that decisions not directly related to profit increase may be considered extra cost rather than capital expenditure and may divert management attention and crowd out more productive investment [6,pp.345-393][11][23]. Also, firms can arbitrage from different levels of green regulations set by governments of different countries. Internationalization provides firms an option to avoid the strict environmental regulations by locating their business functions in a country with rather lax environmental protection standards [2,pp.277-307]. In contrast, firms can adopt higher standards on environmental protection to cope with different level of environmental regulation set by governments in different countries. For example, ISO 14001 certification, as a result their legitimacy can increase [14] albeit expensive. Hence, a firm's internationalization and its adoption of ISO 14001 becomes a line of inquiry.

In this study, we also highlight the importance of other firm-specific characteristics, environmental uncertainty and competitors' actions to earn certifications as facilitators and inhibitors to influence VEP behaviors in different viewpoints [9][22][32]. So, the purpose of this study is to develop a framework that can be used to empirically explore the factors which may drive the adoption of VEP, including the degree of internationalization, the experience of Quality Management System (QMS hereafter), the fulfillment of CSR, the degree of industry uncertainty, and the degree of industry pressure.

LITERATURE AND HYPOTHESES

Since a pioneering paper conducted by [4], ISO 14001 certification is used as the proxy of being green, which has been the most frequently used as one symbol of actions to be green. This study separates the VEP adoption to strategically voluntary and forced voluntary, and proposes hypotheses based on resource-based view and institutional theories.

VEP and ISO 14001 Certification

Firms' intention concerning meeting the level of environmental protection standards differs. According to [9], response to institutional pressure can be dichotomized by two types. One is the environmental strategies of conformance, which means firms stress complying with the regulations made by governments or regulators and adopting standard industry practices. On the contrary, the other is voluntary environmental strategies, which seek to reduce the environmental impacts from operations beyond regulatory requirements [29]. Therefore, voluntary environmental strategies involve creative problem solving and collaborative interactions with stakeholders [28]. However, to obtain ISO 14001 certification is more like a "voluntary" behavior, aggressive with well planned policies not only for basic environmental regulations made by local governments and we apply ISO 14001 certification as the action of VEP.

Internationalization and ISO 14001

With the growing awareness of environmental issues, internationalization provides a solution for firms to avoid these pressures come from governments and other stakeholders by migrating business functions to other countries with relatively lax environmental protection standards [2,pp.277-307][3][11][31]. Also, firms may switch their production facilities to low-standard ones with lax regulations [8][18][30]. These may encourage firms to adopt the VEP to gain the legitimacy.

From the resource-based view (RBV), resources and capabilities provide firms a competitive advantage that allows them to pursue opportunities or avoid threats [5]. VEP can signal a firm's reputation due to its aggressive response to the environmental issues. [15] argued that firms can achieve financial and environmental competitive advantages by integrating natural environmental issues into their strategies. Hence, to ensure their competitive advantage in global markets, firms are more likely to adopt VEP.

Hypothesis 1a: Firms with a higher ratio of foreign sales to total sales are more likely to adopt VEP.

Hypotheses 1b: Firms with manufacturing in more foreign countries are more likely to adopt VEP.

Experience of Quality Management System

From the path-dependency perspective, firms having certified for ISO 9000 may tend to certify for ISO 14001. Quality management systems (QMS) such as ISO 9000 could help firms lower their cost by improving production processes and attenuate pollution by reducing waste in production as well. Scholars find a positive relationship between lean production and environmental performance [16]. So,

we propose that firms with a more efficient production process by experiencing the certification of QMS may increase the likelihood to adopt VEP in the future.

Hypothesis 2: Firms with the experience of QMS certification are more likely to adopt the VEP.

Corporate Social Responsibility

With growing pressures stemming from consumers, governments and other stakeholders, CSR has become increasingly an important issue to a firm in recent years. According to [27], environmental performance improvement program is also a kind of social responsible behavior. Since a VEP may increase companies' reputation and fulfill the commitment to their stakeholders, we therefore propose the third hypothesis below.

Hypothesis 3: Firms with the fulfillment of CSR are more likely to adopt VEP.

Industry Uncertainty

From the perspective of institutional theory, firms have to follow rules such as government regulations, social usages and expectations in the institutional environment to gain legitimacy [10]. Mimetic isomorphism could be a possible explanation of a firm's imitating other successful organizations' behaviors under uncertainty. There may be at least two views concerning the industry uncertainty [1]. One could view industry uncertainty is based on managers' perceptions of the business environment, and others might argue that it depends upon macroeconomic characteristics. Perceived state uncertainty in general business environment may make firms leverage their capability and resource to develop a proactive environmental strategy [1]. Therefore,

Hypothesis 4: Firms under an uncertain environment are more likely to adopt VEP.

Industry Pressure

As a signal of environmental care and clean production, previous studies argue that coercive forces could drive firms toward voluntary green initiatives [9][20], and firms may motivated by industry associations to adopt VEP [9][12]. Besides, scholars argue that organizations are more likely to imitate the behaviors of other organizations which are tied to them through networks [9]. So, firms may be motivated to adopt VEP due to the industry pressure comes from competitors' initiative in adoption of VEP.

Hypothesis 5: Firms under higher industry pressure are more likely to adopt VEP.

METHODOLOGY

We collected secondary data from the Taiwanese electronics listed companies during the period from 2001 to 2008. Multiple sources including the Taiwan Economic Journal (TEJ) Financial Data Bank, Market Observation Post System, and the official websites of sampling firms were used to construct the data base. These firms were divided into six sectors related to the functions of manufacturing or production facilities according to SIC codes. We also tracked the disclosure of annual reports of these firms for a time period of 2001-2008, and compiled it, based on company self-descriptions, to identify when the firms adopted VEP. As defined, VEP in our study refers to certification for ISO 14001 and in our data set, once a firm has certified for ISO 14001, we removed it from further consideration. The sample of 107 firms was assembled after culling the firms went IPO after 2001 and excluding missing values in the preliminary database. We generated 331 firm-year observing points for further analysis and will employ the database and logistic regression to test the hypotheses.

Operations of Variables

VEP- a firm's VEP is used as the certification for ISO 14001 according to the disclosure of its annual reports and official website during the period between 2001 and 2008. The input is equal to 1 to identify that the firm's facilities have certified for ISO 14001 in that fiscal year, and otherwise 0.

Internationalization- we employ **FSTS** calculated as the ratio of foreign sales to total sales to represent a firm's internationalization depth, and **Number of Countries** to show a firm's internationalization breath respectively to measure this independent variable.

Experience of Quality Management System- The variable, **Experience of QMS** (quality management system), was input by certification for ISO 9000 series. We used a dummy variable to code 1 if the firm has obtained a certification for ISO 9001 or ISO 9002 in that fiscal year, and otherwise 0.

The fulfillment of CSR- Using the measurement of the seminal paper on CSR by [4], we examined if a firm acts to present its CSR according to the CSR issues recorded in the Letter to Shareholders of the annual report and can be read in the text of the annual reports.

Industry Uncertainty- We measured the **Industry Uncertainty** by the standard deviation of ROA (return on total assets) by each industry sector in the fiscal year.

Industry Pressure- We measured **Industry Pressure** by counting the number of firms which has obtained certification for ISO 14001 in specific sector.

There are several control variables also incorporated in the model, including *Firm Size* [16][17], *Advertising Intensity* and *R&D Intensity* [21], each firm's annual *ROA*, dummy variables *2001*, *2002*... to *2007* and *Sector Id.1, 2 ... to 5* which stand for sector of other electronics, electronic component, communication networks, photonics and computer & peripheral respectively, to control the *year effect* and the *sector effect* of electronic industry.

Empirical Results

The collinearity problem among variables is not very significant as the VIP values are all below 10. Table 1 illustrates the result of the logistic regression analyses testing the hypotheses. In Table 1, the hypotheses are tested by the input of control variables only in Model 1, and independent variables are introduced to test the significance in Model 2 to 7 respectively due to the correlation among some independent variables in these models. As displayed in Table 1, H1a, H1b, H2, H3 are supported.

Table 1 Logistic Regression Analysis Results of Model Testing

	Model 1		Model 2		Model 3		Model 4	
<i>Constant</i>	-11.63***	(2.590)	-12.46***	(2.398)	-10.74***	(2.636)	-12.86***	(2.711)
<i>Control Variables^a</i>								
<i>Independent Variables</i>								
INTL-FSTS			0.025***	(0.008)				
INTL-No. of Countries					0.348*	(0.179)		
Experience of QMS (ISO 9000)							1.458**	(0.478)
N (observations)	331		331		331		331	
Log likelihood	-112.559		-106.676		-109.828		-107.853	

† $p < 0.1$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$; ^adue to the page limitation, all the coefficients of control variables are omitted in this table

	Model 5		Model 6		Model 7	
<i>Constant</i>	-9.43**	(3.132)	-12.50***	(2.754)	-12.01**	(3.976)
<i>Control Variables^a</i>						

Table 1 Logistic Regression Analysis Results of Model Testing

<i>Independent Variables</i>			
CSR	2.469***	(0.367)	
Industry			0.082 (0.082)
Uncertainty			
Industry Pressure			0.607 (4.682)
N (observations)	331	331	331
Log likelihood	-75.930	-112.047	-112.550

† $p < 0.1$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$; ^adue to the page limitation, all the coefficients of control variables are omitted in this table

Moreover, we adopt the firm performance as a moderator to test if there is a positive moderating effect of firm performance on internationalization-VEP relationship. As displayed in Table 2, there is no significantly moderating effect of firm performance on FSTS-ISO 14001 relationship but a significantly positive moderating effect of firm performance on number of countries-ISO 14001 relationship was discovered. This finding implies firms with the wider scope of internationalization, the higher possibility the firm is to obtain certification of ISO 14001, and firms that widely operates around the world may outperform and have the higher possibility to adopt VEPs.

Table 2 Moderating Effect of Firm Performance on Internationalization-ISO 14001 Relationship

<i>Dependent Variable: VEP: ISO 14001</i>	Model 1		Model 2		Model 3		Model 4	
<i>Constant</i>	-11.626***	(2.590)	-12.457***	(2.398)	-12.002***	(2.711)	-11.904***	(2.721)
<i>Control Variables^b</i>								
<i>Independent Variables</i>								
FSTS			0.025***	(0.008)	0.024**	(0.008)	0.021*	(0.010)
High/low Performance					0.747*	(0.454)	0.341	(0.975)
FSTS *High/low Performance							0.006	(0.013)
N (observations)	331		331		331		331	
Log likelihood	-112.559		-106.676		-105.269		-105.158	
	Model 1		Model 5		Model 6		Model 7	
<i>Constant</i>	-11.626***	(2.590)	-12.457***	(2.398)	-12.002***	(2.711)	-11.904***	(2.721)
<i>Control Variables^b</i>								
<i>Independent Variables</i>								
Number of Countries			0.348*	(0.179)	0.341*	(0.181)	0.056	(0.256)
High/low Performance					0.807*	(0.440)	0.271	(0.569)
Number of Countries *High/low Performance							0.523†	(0.350)
N (observations)	331		331		331		331	
Log likelihood	-112.559		-106.676		-108.045		-106.933	

† $p < 0.1$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$; ^bdue to the page limitation, all the coefficients of control variables are omitted in this table

DISCUSSION AND CONCLUSIONS

Above, our findings suggest that the degree of internationalization, both measured by the degree of depth and that of breadth of internationalized businesses, has a positive impact on the decision of VEP adoption. In addition, echoing the perspective of path-dependency, experience of QMS can play an important role in certifying ISO 14001. Thirdly, a CSR-oriented company is more likely to adopt VEP. Interestingly, firm-specific factors in our models reveal positive significances to a firm's green orientation, while industry-specific ones don't. This may imply driving forces from a firm itself and signal the relationships between a firm's ex ante conditions and its strategic decisions to be green.

Echoing the argument, industry-specific factors are expected to play a forcing role in a firm's adoption of VEP but the insignificance of the results can help explain firm effects may dominate industry effects when a firm is obtaining certification of ISO 14001.

Managerial Implications, Limitations and Directions for Future Research

To respond to different levels of environmental regulation made by different countries, the certification of ISO 14001 provides a one-for-all option for firms to satisfy the needs to the two kinds of pressure mentioned above. Consistent with [8], internationalization may have a positive environmental effect due to a firm's increasing self-governance by multinational ownership, multinational customers and exports to developed countries. Also, consistent with [4], we find that firms with an ISO 9000 experience will lead to a higher likelihood to certify for ISO 14001. The certification can be viewed a way to leverage experience and knowledge to become a source of competency as well. Notably, this study delineates the dominating effects from firm-specific factors to go green. A firm's internationalization degree, past experience of ISO 9000, and its CSR orientation show strong linkage to its adoption of VEP. On the contrary, there are no supports from the results about the impacts of industry-specific factors.

For the lack of supports from the results about the impacts of industry-specific factors, one of possible explanations is that a key successful factor differs among sectors in our samples. Some sectors may reveal strong pressures on a firm's VEP adoption, and others not. There may be some other ways to derive a firm's competitive advantages rather than by ISO 14001 certification in some sectors while not in others. In addition, Taiwan is considered in the transitional process from developing countries to developed ones. A lot of industry factors affecting a firm's strategic decisions might vary in the transformation duration. The pressure will demonstrate heterogeneity to firms in the same sectors which means a firm might perceive stronger pressures from the competitors' going to obtain ISO certification and others won't, owing to different strategic positions the firms in the same sector set in the future. Thus, we can suggest the dominating forces of a firm's green intention are firm-specific characteristics rather than industry ones.

To comprehensively understand the decision making processes through which a firm adopts VEP, we may have to examine what kinds of organizational and/or environmental changes lead to certification for standards to meet eco-friendly requirement. Besides, we may infuse data across industries and countries into the model and compare other management standards or practices relate to environmental protection to enhance the results of generalizability of this paper. Only when these linkages can be elucidated and established can the causality of a firm's characteristics and green actions be clarified. Besides, for future studies including firms established in different countries, we suggest researchers to consider the home countries' social responsibility images. The effects of those firms' home countries' social responsibility images may be a key factor to impact their possibilities and necessities to adopt CSR actions.

REFERENCES

- [1] Aragon-Correa, J. A. and Sharma, S. A Contingent Natural-Resource Based View of Proactive Environmental Strategy. *Academy of Management Review*, 2003, 28 (1), 71-88.
- [2] Ashford, N. *Understanding Technological Responses of Industrial Firms to Environmental Problems: Implications for Government Policy*, 1993. In: Fischer, K. and Schot J. Editors, *Environmental Strategies for Industry*. Island Press, Washington, DC, 277-307.
- [3] Ashford, N. and Heaton G. R. Regulation and Technological Innovation in the Chemical Industry. *Law and Contemporary Problems*, 1983, 46 (3), 109-157.

A full set of references available upon request from Chin-jung Luan by cjluan@mail.ndhu.edu.tw