Institutional Pressure, Environmental Innovation and Performance: Evidence from China

Yina Li[1*], Xiande Zhao[2]
1 School of Business Administration
South China University of Technology, Guangzhou, China
2 Department of Decision Sciences and Managerial Economics,Faculty of Business Administration
The Chinese University of Hong Kong, Shatin, N.T., Hong Kong
***EMAIL: bmliyina@scut.edu.cn**

Abstract: Environmental innovation has strategic importance to cope with the pollution of environment. Organizations often adopt environmental innovation due to institutional pressures. Three institutional pressures may influence environmental innovation practices, which named government, customer, and competitor pressures are explicitly considered in this study. We propose and empirically test a model using data collected from 148 manufacturers in the PRD. The result shows that the institutional pressures come from government, customer, and competitor have significant positive influences on environmental innovation practices. However, we only find significant positive impact of environmental innovation on environmental performance, the effect of environmental innovation on economic performance should be through the mediating role of environmental performance.

Keywords: Environmental innovation, institutional pressure, performance

I. Introduction

The remarkable progress in industrialization in the last two hundred years as well as economic development has hugely accelerated the global interchange of people, goods, and information to an unbelievable extent where the natural environmental has been placed tremendous burden, exceeding its capacity for self-recovery. In recent years, the global warming issue has received a great deal of attention for both public and private organizations. From the 2009 Copenhagen climate change conference we can see the important position of energy-saving and emission reduction, low-carbon economic in nowadays world economic.

Following the trend, many developed countries positive to advocate environmental. For reaching sustainable and green design, every government all advocates industrial to improve environment and protect pollution through making efforts in promoting and developing Green technology. Therefore, environmental sustainability has become another main organizational goal in addition to profit making. Environmental issues and trends have become more and more important to the organization, and they are gradually integrated into organization strategies. In view of this, environmental innovation, which consists of new or modified processes, techniques, systems and products to avoid or reduce environmental damage, becomes more and more important to companies.

The research on the determinants of general innovation is vast, such as technology pull and demand push（Freeman & Soete, 1999）. However, environmental innovation is different from other innovation for it also improves environmental quality. The growing environmental regulations, consumers green consciousness, firm-internal conditions, et al. may have impact on companies' adoption of environmental innovation practices (Bernauer et al., 2007). For this reason, it seems to be essential to analyze the variety of measures that may provide sufficient incentives to spur environmental innovation practices. Environmental innovation and its determinants have received increasing attention during the past years. However, the results are inconsistent, especially regarding the impact of regulation. Hence, different from the previous literature, following the "Institution-practice adoption-economic and social result" framework, the large scale survey research is suggested to explore the driving forces and the effects of environmental innovation on firm performance – both economic and environmental.

II. Literature Review

What triggers environmental innovation behavior? Our theoretical framework, which predicts the antecedents of environmental innovation practices, is guided by institutional theory.

Institutional pressures and environmental innovation

Since managers' decisions and interactions take place within a social network that is affected by stakeholders, a theoretical perspective that accounts for the impact of the social climate, rather than simply the economic, rational perspective alone, is more encompassing and may better explain organizations' behaviors. More and more researchers have increasingly acknowledged the importance of institutional theory in explaining firm-level behaviors. Here we refer to the three forms of institutional pressures identified by DiMaggio and Powell (1983), named as coercive pressure, normative pressure and mimetic pressure. Each of these three pressures suggests testable hypotheses relevant to examine the antecedents of environmental

innovation practices. Coercive pressure stems from political influence and the problem of legitimacy, in this paper we use government environmental related regulations to represent coercive pressure for a firm's adoption of environmental innovation practice. Normative pressure stems from pressure of professionalization, which cause firms to be perceived as more legitimate (Zhu & Sarkis, 2007). Each firm surviving in the society is subject to the norms, standards, and expectations of its external stakeholders (Lai, Wong & Cheng, 2006). Consumer requirements form the core normative pressure (Zhu & Sarkis, 2007). Mimetic pressure is a firm's standard responses to uncertainty. Firms are inclined to imitate the behaviors of other organizations that they perceive as successful in their industry or they have social ties when they are faced with environmental uncertainty, through doing these, which will help to enhance their own legitimacy (DiMaggio & Powell, 1983). Hence we use competitive pressures to measure mimetic pressure for a firm's environmental innovation practices.

H1a: Government command-and-control environmental regulation is positively associated with a firm's environmental innovation practice.

H1b: Government economic incentive instrument is positively associated with a firm's environmental innovation practice.

H2a: Overseas customer' green consumerism is positively associated with a firm's environmental innovation practice.

H2b: Domestic customer' green consumerism is positively associated with a firm's environmental innovation practice.

H3: Competitive pressure is positively associated with a firm's environmental innovation practice.

Environmental innovation and performance

A growing literature examines the relationship between environmental practices and firms performance (Porter,1 995;Klassen and McLaughlin,1996;Melnyk et al.,2003; Eiadat et al.,2008) by both anecdotal cases and large-scale research, however, the results are mixed. It is clear that the debate on the relationship between environmental practices and performance continues. Environmental innovation is often viewed as an avenue to comply with environmental goals in a cost-effective way (Frondel et al., 2008). Ecological modernization theory (EMT) core thought: Through the adoption of environmental innovation strategy, achieve both the environmental and economic performance and realize environmental friendly society (Murphy,2000; Mol,2000). From the perspective of EMT, there are immediate and long term performances. The former include waste reduction and elimination, resource recovery and reuse. The latter include resource conservation and clean production to sustain economic growth. In addition, Some empirical results revealed that environmental performance and economic performance are positively linked (Russo & Routs,1997; Klassen & McLaughlin,1996; Jacobs, Singhal & Subramanian, 2008), while some are negatively linked (Walley & Whitehead, 1995; Fogler & Nutt, 1975).

H_4: Environmental innovation practice is positively associated with a firm's environmental performance.

H_5: Environmental innovation practice is positively associated with a firm's economic performance.

H_6: A firm's environmental performance is positively associated with a firm's economic performance.

Fig.1 shows the conceptual framework of this paper.

Please Insert Fig.1 about Here

III. Methodology

Sampling and data collection

The research analyses firms in this study come from the manufacturers in Pearl River Delta.

Due to the difficulties in collecting date, convenience sampling method was used in this study. The selected EMBA/MBA students and Master of Engineering students of South China University of Technology, one of the two top universities in Pearl River Delta, were asked to complete the survey. These selected students were top and middle-level managers from manufacturing enterprises in Pearl River Delta. The objective of the survey and the basic concepts of institutional pressures and environmental innovation were briefly introduced to them to make the definition clearer. Two rounds of questionnaires were distributed. In the first round, 500 questionnaires were distributed during December, 2008 to March, 2009, 134 manufacturing enterprise responses were received, within which 26 responses are ineffective due to incomplete information. Hence there are altogether 108 effective questionnaires. The second round questionnaires were sent out during July, 2009 to September, 2009. within 138 questionnaires distributed, 40 out of 77 questionnaires received were found to be effective. We use t-test to compare the results of these two groups, and no statistical differences were found in all 27 items. Hence, we combine the full data set of 148 questionnaires to do further analysis.

Factor analysis

An exploratory factor analysis (EFA) was employed for data reduction and determining the main constructs measured by the items. Factors were extracted using the principal components analysis followed by a varimax rotation. Kaiser normalization (eigenvalues >1) was used to clarify the factors. The results of EFA are shown in Table 1 to Table 3. The correlation matrix is shown in Table 4.

Please Insert Tables 1 to 4 about Here

The structural models

We use Structural Equation Model to test all relationships between latent variables and observed variables, and the relationships among multiple latent variables simultaneously. Maximum likelihood estimation revealed that all but three of the hypotheses are significant. The goodness of fit indices

were, Chi-square=503.77, df=279, CFI=0.929, NNFI=0.917, RMSEA=0.074, which are better than the threshold values suggested by Hu et al.(1992).

Please Insert Fig. 2 about Here

IV. Results and Discussions

Institutional pressures and environmental innovation practices

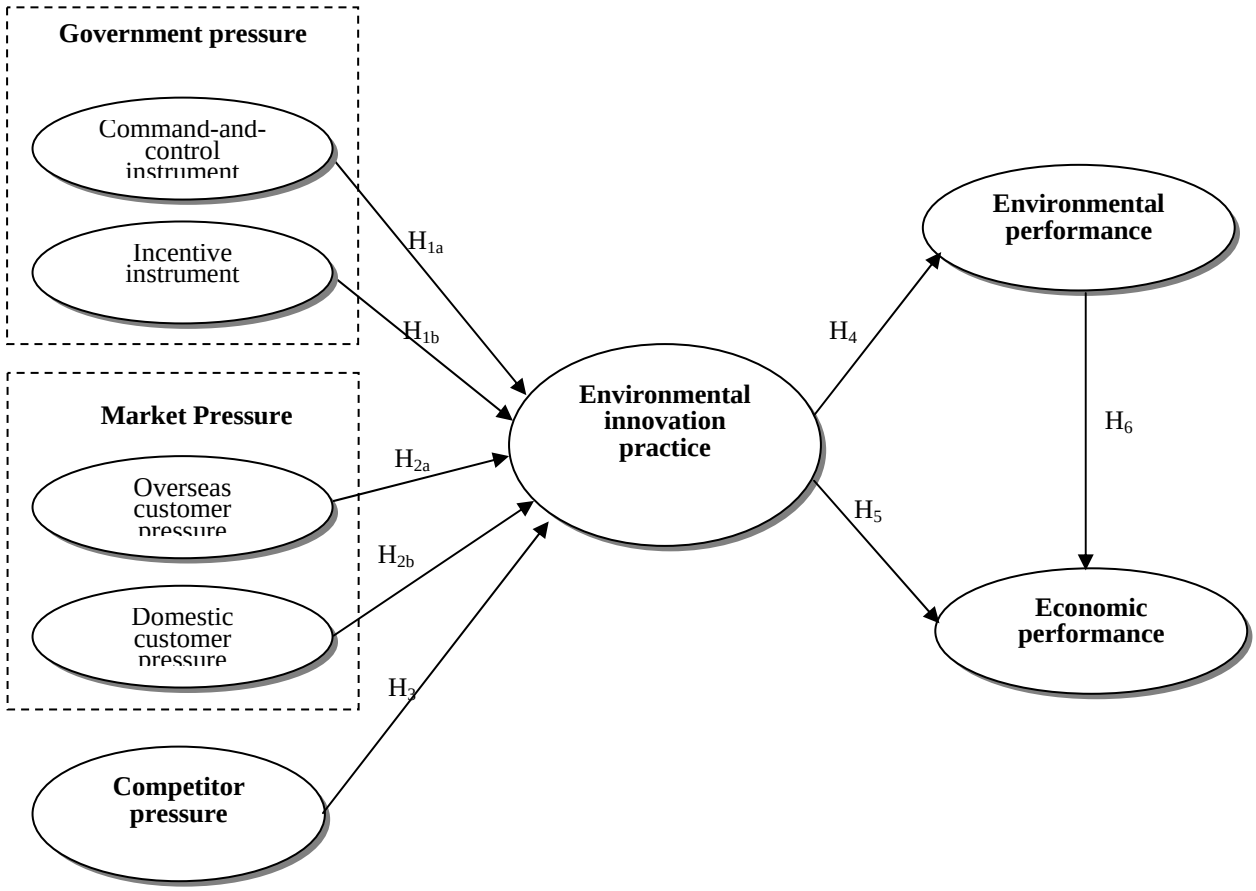
The results show that all three institutional pressures: government, customer and competitor have significant positive on firm's environmental innovation practices. Interestingly, we find command-and-control regulation have significant positive impact on firm's environmental innovation, while incentive instrument does not work. This may be due to the Chinese imperfect incentive instrument. Hence, building environmental-friendly incentive instrument is very important to Chinese policy makers. And we only find significant impact of overseas customer on firm's environmental innovation. This may indicate in some extent that Chinese firms put more emphasis on overseas customers' green consumerism.

Environmental innovation practices and performance

We find significant positive impact of environmental innovation practice on environmental performance. However, we do not find significant impact of environmental innovation practice on economic performance. Environmental innovation only has significant positive impact on economic performance through the mediation role of environmental performance. This may be due to the reason that Chinese firms are at the beginning stage of environmental innovation, and it will spend many financial resource on environmental innovation, while get financial result after several years, hence, there maybe some lag effect on economic performance.

References

Please contact to Dr. Yina LI at
Email: bmliyina@scut.edu.cn to get the references.



Figue 1 The conceptual model

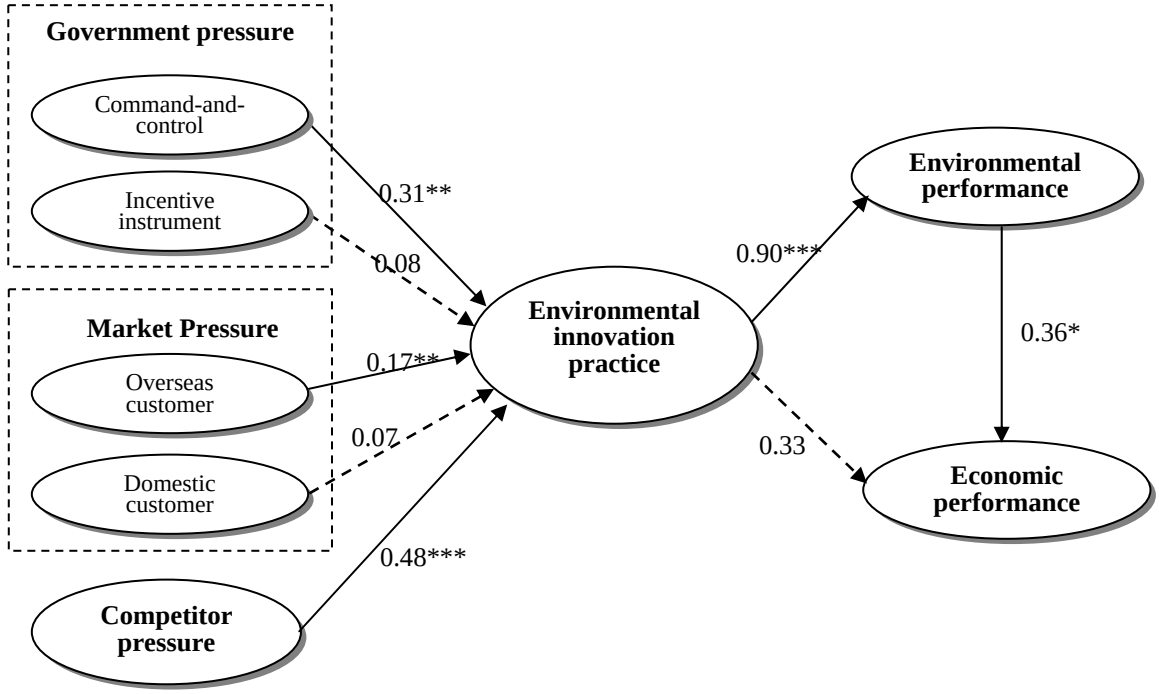


Figure 2 SEM results

***, **, * represent p<0.01, p<0.05 and p<0.1, respectively.

Table 1 Factor analysis result for institutional pressures

Item	Factor loadings					Cronbach's alpha
	Command-and-control instrument	Incentive insturment	Overseas customer pressure	Domestic customre pressure	Competitor pressure	
GP1	**.679**	-.045	.085	.505	.114	
GP2	**.836**	.201	.297	.046	.192	0.818
GP3	**.829**	.263	.243	-.040	.205	
GP4	.050	**.892**	-.039	.180	.196	
GP5	.178	**.862**	-.040	.139	.128	0.825
GP6	.139	**.685**	.132	.078	.255	
MP1	.212	.033	**.892**	.179	.064	
MP2	.242	-.009	**.917**	.124	.125	0.901
MP3	.099	.187	.193	**.868**	.246	
MP4	.047	.304	.164	**.773**	.382	0.900
CP1	.244	.212	.083	.308	**.789**	
CP2	.117	.219	.089	.165	**.889**	
CP3	.157	.211	.087	.181	**.877**	0.919
Eigenvalue	1.333	2.024	1.025	0.830	5.676	
KMO			0.781			
Total variance explained			83.76%			

Table 2 Factor analysis result for environmental innovation practice

Item	Factor loading	Cronbach's alpha
	Environmnetal innovation practices	
EI1	**.862**	
EI2	**.627**	
EI3	**.845**	0.876
EI4	**.808**	
EI5	**.787**	
EI6	**.780**	
Eigenvalue	3.729	
KMO	0.828	
Total variance explained	62.15%	

Table 3 Factor analysis result for firm performance

Item	Factor loading		Cronbach's alpha
	Environmental performance	Economic performance	
FP1	**.926**	.237	0.958
FP2	**.919**	.245	
FP3	**.896**	.301	
FP4	**.829**	.376	
FP5	.402	**.765**	0.844
FP6	.360	**.831**	
FP7	.094	**.851**	
FP8	.498	.541	
Eigenvalue	5.248	1.134	
KMO	0.893		
Total variance explained	79.78%		

Table 4 Correlation matrix of constructs

Construct	Mean	SD	1	2	3	4	5	6	7	8
Command-and-control instrument	6.05	0.91	1							
Incentive insturment	4.62	1.50	.364**	1						
Overseas customer pressure	5.91	1.23	.501**	.112	1					
Domestic customre pressure	5.23	1.24	.388**	.445**	.350**	1				
Competitor pressure	5.07	1.41	.453**	.487**	.268**	.581**	1			
Environmental innovation practice	5.39	1.18	.599**	.449**	.408**	.501**	.645**	1		
Environmental performance	5.67	1.21	.615**	.477**	.453**	.491**	.656**	.773**	1	
Economic performance	5.01	1.31	.285**	.467**	.165*	.401**	.562**	.532**	.603**	1

** represents p<0.01,* represents p<0.05