

Research on the influence of institutional pressures on green innovation strategy

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Abstract. Based on the new Institutional theory and the sample of 116 enterprises, this paper explores the influencing factors of green innovation strategy from the perspective of forced pressure, normative pressure and imitation pressure. The results show that the mandatory regulation, the incentive regulation, the supply chain pressure, and the competitive pressure all have a significant and positive impact on the green innovation strategy. Therefore, the government should take steps to stimulate enterprises to choose the green innovation strategy.

1. Introduction

The contradiction between environment and sustainable development has become an important factor hinders the development of the economy. The traditional mode of economic development relying on the resource consumption can't meet the needs of human society. The new mode of production is of great importance to the environment and resources. Green innovation strategy has become an important research topic in the field of enterprise management. Only putting the environmental issues into the strategy, can enterprises got the core competitiveness in the market. In general, enterprises lack the motivation to take green innovation strategy because of the externality of the green innovation behavior.

Research in the past focused on the influence of the consumers, the public, the media, and the competitors on the strategy choice of the enterprises. It is hard to fully reveal the driving factors of the green innovation strategy by studying the aspects in separate.

Based on the new Institutional theory, this paper explores the driving factors of the implementation of green innovation strategy. The new Institutional theory holds that the behavior of the enterprises in the social network is influenced by the various stakeholders, and the enterprises can improve the competitiveness by satisfying the needs of the stakeholders. Institutional pressures mainly include three aspects: forced pressure, normative pressure and imitation pressure.

2. Literature review and hypothesis

2.1. Forced Pressure: Regulating Pressure and Green Innovation Strategy

The social organizations that the enterprises rely on would cause many pressures. Laws and regulations developed by the government are important driving forces for the implementation of green innovation strategy (Porter, Van der Linde, 1995). On the one hand, the government developed



mandatory regulations such as sewage standards to bind the behavior of enterprises. On the other hand, the government developed incentive regulations such as economic compensation, tax incentives to encourage enterprises to choose the green innovation strategy actively. In this study, the forced pressure is divided into two dimensions: mandatory regulation and incentive regulation. Therefore, we hypothesize that:

H1a: The mandatory regulation has a significant and positive impact on the green innovation strategy.

H1b: The incentive regulation has a significant and positive impact on the green innovation strategy.

2.2. Normative Pressure: Supply Chain Pressure and Green Innovation Strategy

Normative pressure refers to the fact that an enterprise is subject to the pressure of external forces. And enterprises tend to adopt practices that are generally recognized in the industry to be legitimized. What's more, the pressure from the supply chain is the core of the normative pressure (Zhu, Sarkis, 2007). On the one hand, suppliers choose enterprises to cooperate in innovation through its rights of supply, so as to reduce the green innovation costs and risks. On the other hand, customers can stimulate enterprises to choose green innovation strategy through their purchase rights. At the same time, enterprises can also obtain the customer favor and corporate reputation. Therefore, we hypothesize that:

H2: The supply chain pressure has a significant and positive impact on the green innovation strategy.

2.3. Imitate pressure: Competitive Pressure and Green Innovation Strategy

Imitation pressure refers to that enterprises in the social network will imitate others because of the influence of competitors. The imitation pressure mainly comes from competitive pressures (Menguc et al, 2010). And the pressure from existing competitors, potential entrants, and substitutes is the main source. Enterprises will imitate the leaders in the industry and pay close attention to the market competition. If the competitors win the market and competitive advantages by implying the green innovation strategy, enterprises will adopt a similar strategy. Therefore, we hypothesize that:

H3: The competitive pressure has a significant and positive impact on the green innovation strategy.

3. Methods

3.1. Questionnaire design:

Before designing the questionnaire, we compiled literatures, collected expert opinions, and conducted a pre-survey. The questionnaire was measured using the Likert's 7 point scale.

3.2. Variable design and measure

3.2.1. Dependent variable. Green Innovation Strategy: We obtained 7 items from Chan (2005).

3.2.2. Independent variables. (1) The regulation pressure. We divided the forced pressure into two dimensions: mandatory regulation and incentive regulation. We obtained 8 items (mandatory regulation 4 items and incentive regulation 4 items) from Jaffe (2004), Li Y. N., et al (2013). (2) The supply chain pressure: We obtained 2 items from Tang (2012). (3) The competitive pressure: We obtained 4 items from Tang (2012).

3.2.3 Control variables: We chose firm size, firm age and corporate nature as control variables.

3.3. Samples and date collection

We chose some manufacturing enterprises which brought serious pollution as the objects of investigation from Shandong, Jiangsu, Zhejiang and other places. A total of 350 questionnaires were distributed and 181 were recovered. The recovery rate was 51.7%. Eliminating incomplete

questionnaires and content contradiction questionnaires, 116 questionnaires were retained. The effective rate was 33.1%. The descriptive statistics of the samples are shown in Table 1:

Table 1. The basic situation of the samples

Firm age			Enterprise sales revenue			
<3years	23	19.8%	<5 million	19	16.4%	
3-5 years	26	22.4%	5 -50 million	56	48.3%	
>5 years	69	57.8%	50-100 million	29	25.0%	
Number of employees			>100 million	12	10.3%	
<100 employees	41	35.3%	Industry			
100-499 employees	27	23.3%	Chemical	18	15.5%	
500-999 employees	19	16.4%	mechanical	10	8.6%	
1000-2000 employees	20	17.2%	Textile	11	9.5%	
>2000 employees	9	7.8%	papermaking	8	6.9%	
The nature of the enterprise			Pharmaceuticals	5	4.3%	
State - owned enterprises	42	36.2%	Electronic manufacturing	6	5.2%	
Private Enterprises	50	43.1%	leather	6	5.2%	
Collective enterprises	16	13.8%	cement	11	9.5%	
other	8	6.9%	other	41	35.3%	

3.4. Reliability and validity analysis of the scale

The reliability and validity of the scale were analyzed. The α coefficients of each scale were more than 0.8, and the KMO values were more than 0.6, which had showed a good reliability and validity.

4. Results

4.1. Descriptive statistics and correlation analysis

The green innovation strategy was significantly correlated with mandatory regulation, incentive regulation, supply chain pressure and competitive pressure ($p < 0.01$).

Table 2. Correlation analysis

Variables	MEAD	S.D.	Green Innovation Strategy	Mandatory regulation	Incentive regulation	Supply chain pressure	Competitive pressure
Green Innovation Strategy	4.059	1.270	1				
Mandatory regulation	4.019	1.380	.863**	1			
Incentive regulation	4.084	1.409	.892**	.820**	1		
Supply chain pressure	4.069	1.375	.894**	.851**	.848**	1	
Competitive pressure	3.911	1.456	.826**	.695**	.772**	.697**	1

** Significant correlation at .01 level (bilateral)

4.2. Multilayer regression analysis

Table 3 shows the regression results of institutional pressure and green innovation strategy: the mandatory regulation ($\beta = .202$, $p < .01$), the incentive regulation ($\beta = .240$, $p < .001$), the supply chain pressure ($\beta = .329$, $p < .001$) and the competitive pressure ($\beta = .272$, $p < .001$) all have a significant and positive impact on the green innovation strategy.

Table 3. The regression results between Institutional pressures and green innovation strategy

Dependent variable = Green innovation strategy	Model 1	Model 2	VIF
Control variables			
Small business	-.070	-.058	1.652
Medium-sized enterprises	-.103	-.036	1.683
<3years	-.113	-.006	1.202
3-5 years	-.024	.037	1.138
State - owned enterprises	-.013	-.041	1.823
Private Enterprises	-.008	-.051	1.809
Independent variables			
Mandatory regulation		.202**	4.405
Incentive regulation		.240***	5.199
Supply chain pressure		.329***	5.130
Competitive pressure		.272***	2.615
R2	.022	.911	
F	.407	107.641***	
ΔR^2		.889	
ΔF		262.637***	

*** $p < .001$; ** $p < .01$;

5. Conclusion and discussion

The mandatory regulation, the incentive regulation, the supply chain pressure and the competitive pressure all have a significant and positive impact on the green innovation strategy.

Based on the above research, we put forward the following suggestions to the government: Firstly, the government should pay attention to the combination of mandatory regulations and incentive regulations, and promote the choice of green innovation strategy in different ways. Secondly, the government should pay attention to the cultivation of green awareness. The ideas of green production and consumption should be created. Thirdly, making full use of the supply chain pressure (caused by suppliers and consumers) and the competitive pressure (caused by existing competitors, potential entrants, and substitutes) to encourage enterprises to imply green innovation strategy.

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