

# Mechanism of Enterprise Green Innovation Process under Institutional Void and Fragility: A Multi-case Study

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**Abstract**—Under the transition context characterized by institutional void and fragility, how manufacturing enterprises achieve green innovation? In order to fill this research gap, this paper carry out longitude and horizontal comparative case study and found that: “stimulation-response mechanism” can stimulate manufacturing enterprises to achieve green innovation effectively in a institutional void and fragility situation. First, the stimulus mechanism: Compared with the single institutional pressure, complementary and interactive institutional pressure is able to overcome the fragility of the institutional itself. Response mechanism: compared to single logic based enterprises, enterprises based on commercial and social welfare mixed logic are more likely to cultivate strategic flexibility and environmental ethics, in response to multiple institutional pressures to adopt a compliant legitimacy strategy to achieve green innovation. This study reveals the "stimulus-response" mechanism underlying enterprise green innovation, and contributes to institutional theory and dynamic capability theory.

**Index Terms**—green innovation, institutional pressure, stimulation, response, institutional void, institutional fragility

## I. INTRODUCTION

Research found that institutional of environmental protection is missing; and the fragility of institutional cannot effectively promote the enterprise to carry out green innovation, but complement multi-institutional pressure can make up for INSTITUTIONAL VOID AND OVERCOME institutional fragility to drive enterprises green innovation. Due to the traditional economic institutions, there are "government failure" phenomenon and "market failure" phenomenon in China. Therefore, in order to prevent the "government failure" and "market failure", government intervention needs and market demand to form a cooperative and complement relationship. The essence of this problem: under the situation of institutional void and fragile, the stimulus and response mechanism of the multiple institutional pressure on local manufacturing enterprises can promote enterprises to achieve green innovation.

In order to solve this problem, this paper chooses two kinds of Zhe Jiang local manufacturing enterprises to reveal the "stimulus-response" mechanism in the process of environmental protection technological innovation of local manufacturing enterprises, which contributes to the theory of institutional and dynamic capability. Besides, in terms of local institutional, culture and resource situation, putting forward the institutional optimization suggestions and enterprise management proposal.

## II. LITERATURE REVIEW

### A. The Connotation of Enterprise Green Innovation

Enterprise green innovation refers to the enterprise to implement the technological innovation to reduce or avoid the environmental damage [9]. The concept comes from the green innovation theory and the triple bottom line principle [9][11].

### B. The Causes of Enterprise's Green Innovation

According to the early institutional theory, enterprises want to survive, the behavior must follow the provisions of the institutional environment to obtain legitimacy [7]. Cognitive theory holds that the subjective perception of the objective environment leads to the reaction behavior [8]. As the two types of institutional pressure-regulation pressure and normative pressure-will have an impact on green innovation. Regulation pressure is the pressure imposed by the government through rules, controls, incentives and sanctions etc.; normative pressure is the pressure that customers through the value of the standard system to exert pressure on the enterprise.

The researches about business ethics discuss the reasons about manufacturing enterprises technological innovation from the perspective of the organization inner. The research of business ethics thinks that green innovation enterprises not only to follow the profit business logic, but also need to have social welfare business logic [13]. But there are implicit conflicts between these two kinds of logic.

### C. Institutional Void and Institutional Fragility

Institutional can guide corporate behavior and market activities. If institutional is absent and fragile, a social structure is needed to guide market and enterprise to

operation [26]. Some scholars have found that despite the frequent changes in the environment, the emerging market institutional is missing, but there are still many enterprises in such an environment through the reputation of long-term survival[27][28]. In addition to the reputation that can make the enterprise survive in a fragile institutional environment for a long time, partnerships may offer a systemic approach to addressing institutional gaps. In china, the institutional and norms for environmental protection are very imperfect. China in recent years, began to focus on environmental protection. Due to the missing and fragile institutional, many enterprises lack the environmental responsibility of this sense of social responsibility.

### III. METHODOLOGY

#### A. Method Selection and Case Sample Selection

In this paper, the author uses theoretical multi-case study method. Taking the data availability, typical, and convenience [8] into account, we select ZJSD Tower Co., Ltd. and ZJKC Environmental Protection Technology Co., Ltd. as the research samples(see in table I). Multi-case longitudinal research methods can effectively solve the problem of lack of universality in single case and help to deepen the understanding of similar events.

TABLE I. BASIC SITUATION

enterprise	industry	Years	Staff size	Ownership	Business conditions
ZJSD Tower Company Limited	Machinery Industry	39	More than 1,300 people	State-owned	Providing transmission lines tower, steel tower and substation structure for Zhe jiang and the national power grid construction. It is the country's largest tower, steel tower and substation frame manufacturing professional company
ZJKC Environmental Protection Technology Co., Ltd	Water treatment industry	9	More than 300 people	Private	Specializing in membrane separation technology based on the various types of engineering applications. Developed a number of environmental protection for the field of sewage treatment technology.

#### B. Analysis

This paper adopts the "inverted" logic, according to the enterprise green innovation time node division stage [21], and then horizontal analysis of the various stages of government and market to promote enterprise green innovation mechanism.

#### C. Data Collection

This study uses multi-source data [21]. Analysis will be mainly based on interviews, and to be supplemented by questionnaire data, documentation, and archival records. This chapter reconciles the two principles (to maintain a relatively loose concept category, is conducive to the accumulation of knowledge), as shown in Table II below. By searching for the relevant statements in the data and categorizing them, using equivalence method to define the level of the word frequency. The frequency scale definition is shown in Table III.

TABLE II. THE CONNOTATION AND MEASURE OF RELATED IDEAS

Ideas	Dimension	Measure the keyword table	Representative scholar
Institutional pressure	Regulation	Environmental protection policies; environmental laws and regulations; environmental incentives; pollution penalties policy.	Colwell and Joshi (2013)
	norm pressure	Customer environmental protection needs; industry market trade association / professional association to encourage enterprises to environmental protection.	
Strategic flexibility	Resource flexibility	Configuring marketing and production resources flexibly for diversified products; designing product flexibly ; for the characteristics of specific products and market segments target, redefine the product.	Sanchez (1995) ; Zhou and Wu (2010)
	Coordination flexibility	Enterprises can re-configure the resource chain flexibly in the product strategy implementation, product development, and production and delivery process.	
Environmental ethics	Environmental logic	The company has a clear and specific environmental policy; the budget plan includes environmental investment and procurement; the environmental plan, vision, mission integrate with marketing events and corporate culture.	Chang (2011)
Legitimacy strategy	Obedience	Obey institutional in practice	Crilly et al (2012)
	avoid	Say and do not match , and avoid the institutional requires to act according to their own wishes	
green innovation	Environmental protection products, technology	Environmental protection patent and award-winning; new products using environmentally friendly materials, environmentally friendly packaging; recycling products; clean production	Berrone et al (2013)

TABLE III. WORD FREQUENCY LEVEL DEFINITION STANDARD TABLE

Word frequency range	Level
0—8	Low
9—17	medium
≥18	higher

## IV. CASE ANALYSIS

For ZJSD Tower Co., Ltd., zinc green environmental protection technology patents in 2005 as a

sign event ,it can be divided into two phases: stage one (1978 - 2005: Has not yet carried out green innovation stage), stage two (2005) Year to date: start green innovation stage).

TABLE IV. CONSTRUCT CODING OF ZJSD COMPANY --STAGE ONE

Construct	category	WF	level	Examples of typical references
Institutional pressure	Regulation pressure	12	medium	The government has set limits on our industry, if you do not meet environmental restrictions, it will not grant you land.
	norm pressure	0	Low	no
Strategic flexibility	Resource flexibility	0	Low	no
	Coordination flexibility	0	Low	no
Environmental ethics	Altruistic environmental logic	0	Low	no
Legitimacy strategy	avoid	14	medium	The cost of environmental innovation is very high, so that corporate profits must be less, so we did not pay more attention to environmental protection at the beginning.
	obedience	0	Low	no
green innovation	environmental protection products and technology	0	Low	no

TABLE V. ZJSD TOWER CO., LTD. WORD FREQUENCY RATING--STAGE TWO

Construct	category	WF	level	Examples of typical references
Institutional pressure	Regulation pressure	14	medium	Our company in Hangzhou a tourist city, if the environmental protection of our company is not good, the government will ask us to close the company, so we must engage in this project.
	norm pressure	15	medium	If the environmental protection not meet the requirements of foreign customers, foreign customers will not place an order

Strategic flexibility	Resource flexibility	28	higher	We are on the basis of the original formula to change and debug
	Coordination flexibility	26	higher	After the decision of our corporate leadership, the following people will coordinate the implementation of resources.
Environmental ethics	Altruistic environmental logic	22	higher	We have considered environmental investment and procurement in our budgets, combining environmental initiatives, environmental perspectives, environmental missions, marketing events and corporate culture.
Legitimacy strategy	avoid	0	Low	no
	obedience	20	higher	The original product in the galvanized to take into account the sewage, and now it changed into no water rinse.
green innovation	environmental protection products and technology	21	higher	No rinse water ordinary hot dip galvanizing process won the national scientific and technological progress second prize.

For ZJKC Environmental Protection Co., Ltd., in order to undertake Nan tong waste water treatment project, in the process of film development focus on environmental protection as a landmark event, which can be divided into two stages: stage one (2008 - 2012: try green innovation stage) Phase II (2012 to present: vigorously carry out green innovation stage). The phased design and word frequency levels of the two companies are shown in in follow tables.

TABLE VI. CONSTRUCT CODING OF ZJKC COMPANY --STAGE ONE

Construct	category	WF	level	Examples of typical references
Institutional pressure	Regulation pressure	27	higher	Sewage treatment is often the government-led municipal works, this is a new opportunity for our company.
	norm pressure	18	medium	The public is supported the industry of environmental protection , because it will improve their living environment.
Strategic flexibility	Resource flexibility	15	medium	I am from Zhe jiang Province water treatment center, having technical basis, but I cannot bring out the market resources.

Coordination flexibility	16	medium	There are some modular technologies that can be used in our film products, but the core technology is difficult to transfer.	
Environmental ethics	Altruistic environmental logic	3	Low	In the start-up stage, which is mainly to survive. We live on environmentally friendly products
Legitimacy strategy	avoid	12	medium	The costs of clean production are high, so that corporate profits must be less, so we did not pay more attention to environmental protection initially.
	obedience	0	Low	no
green innovation	environmental protection products and technology	11	medium	In 2009, receiving an industrial waste-water treatment project in Nantong, but cleaner production was less concerned.

TABLE VII. CONSTRUCT CODING OF ZJKC COMPANY --STAGE TWO

Construct	category	WF	level	Examples of typical references
Institutional pressure	Regulation pressure	28	higher	Five water co-governance project itself has a per-period, two or three years, three or four years. The old local government is in the inspection early.
	norm pressure	27	higher	Waste water treatment is more demanding than industrial boiling water treatment .The scale of industrial waste water is shrinking.
Strategic flexibility	Resource flexibility	21	higher	The technical source is from another school-based enterprises, then we develop a new polyvinylidene fluoride.it has a close relation with the before technical .
	Coordination flexibility	22	higher	Now we adjusted the organizational structure . Improving efficiency by reconfiguration of organizational structure.
Environmental ethics	Altruistic environmental logic	19	higher	When we develop better and grasp the social resources more, the responsibility should be bigger. This is very basic.
Legitimacy strategy	avoid	0	Low	no
	obedience	26	higher	Entrepreneurs like us,our own environmental philosophy and sense of responsibility is relatively strong. We will not earn profits through the row after we have the ability.
green innovation	environmental protection products and technology	24	higher	In 2014 , we have the opportunity to do a Nan tong zero emissions project, political influence is also great, social benefits are more obvious.

#### A. Cross - case Analysis and Proposition

This paper reveals the influencing factors (institutional pressure, strategic flexibility, environmental ethics and legitimacy selection strategy) and its mechanism of driving technological innovation of manufacturing enterprises. The two-stage comparison of sample enterprises is shown in Table VI below.

TABLE VI. CROSS-SCENARIO COMPARISON ACROSS CASES

Construct enterprise	Regulation pressure	Norm pressure	Resources flexibility	Coordination flexibility	Environmental ethics	Legitimacy strategy	green innovation
ZJSD Tower Company Limited	—	↑	↑	↑	↑	Medium avoidance → Higher obedience	↑
ZJKC Environmental Protection Company Limited	—	↑	—	—	↑	Medium avoidance → Higher	↑

*1) Stimulating Mechanism: the government and the market to generate complementary and interactive institutional pressure to stimulate local manufacturing enterprises green innovation.*

We can find that when the institutional pressure faced by enterprises is increasing, and each other appears complementary and interactive relationship, the enterprise is more easily consistent with the institutional pressure requirements to conduct green innovation. To ZJSD company, for example, in the first stage, the company is only facing normative pressure from the government. The second stage, market norms and government regulations to achieve a complementary in the market incentives and pollution emissions, which stimulate the ZJSD galvanized technology research and development from the external drivers. For ZJKC, although the first stage of higher regulation pressure and normative norm pressure is complementary in the incentive and punishment, but little interaction between each other. In the second stage, influencing by the Zhejiang Province's "five water governance" policy, the government regulation not only to supplement the market norms, but also enhance the public environmental protection concept.

Thus, regulation and norm of complementary institutional pressure from the government and the market has produced synergies in the manufacturing enterprise green innovation process.

Proposition 1: The coordination of government and market can generate complementary institutional pressure to compensate enterprises institutional void, which can directly make manufacturing enterprises to follow the legitimacy of the strategy and stimulate manufacturing enterprises green innovation.

Proposition 2: The coordination of government and market can generate interactive institutional pressure to overcome the institutional fragility, which can make

manufacturing enterprises to follow the legitimacy of the strategy and stimulate the manufacturing enterprises green innovation.

2) *The Response Mechanism: local manufacturing enterprises based on profit and social welfare mixed logic, cultivating strategic flexibility and environmental ethics, taking the initiative to comply with the response to multiple institutional pressure and promoting green innovation.*

The performance of ZJKC company in the first stage can be seen, even if it faces the government regulation and market norms are strong, but its green innovation is not high, only moderate level. But in the second stage, in the circumstances that the pressure of regulation and norm are equivalent, due to the improvement of strategic flexibility and environmental ethics to stimulate green innovation behavior. Thus, the strategic flexibility and environmental ethics can help enterprises more initiative to respond to the system amenably. Based on the above analysis, the following propositions can be made.

Proposition 3: Compared to the single logic-based enterprises, enterprises based on profit and social welfare mixed logic, easier to cultivate strategic flexibility and environmental ethics, in response to multiple institutional pressures to adopt a compliant legal strategy to green innovation.

#### IV. CONCLUSION

##### A. Theoretical Contribution

First of all, finding that government and market synergy to overcome institutional fragility and compensate enterprises institutional void, which contribute to the theory of the system. Through two methods of the exploratory case, this study finds that the pressure of complementary and interactive institutional under the local institutional context has the strongest effect on the enterprise green innovation. It is of theoretical significance.

Secondly, by identifying the mixed logic of organizational heterogeneity in the integration of local institutional, resources and cultural contexts, it contributes to the integration of institutional theory, dynamic competence theory and business ethics.

##### B. Institutional Optimization Suggestions

First of all, from the government and the market complement each other and benign interactive collaboration can effectively stimulate the local manufacturing enterprises to green innovation.

Secondly, some measurements of promoting marketization need to be taken.

Thirdly, the combination of government and market pressure can fill the lack of green innovation institutional, which also can effectively stimulate manufacturing enterprises to green innovation. Thus, completing institutional environment is very important.

##### C. Limitation and Future Research Direction

First, the future study may be appropriate to expand the sampling range and quantity. Secondly, the future

research can be based on the degree of pollution, the industry segmentation study. Thirdly, future research can be based on technology and products, green innovation to further distinguish the study.

#### ACKNOWLEDGEMENT

This research is supported by Zhejiang philosophy and social science planning project (Grant No.:16NDJC190YB); National Natural Science Foundation (Grant No.:71502165); Zhejiang philosophy and social science planning project for "Zhejiang Young scholars of social science" (16ZJQN035YB); Zhejiang Provincial Natural Science Foundation of China (LQ13G020005). This research is also supported by the key research of 2016 Wenzhou Federation of Humanities and Social Sciences Circles (Grant No.:16wsk239).

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