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THE MODERATING EFFECT OF SLACK RESOURCES ON THE RELATIONSHIP BETWEEN BOARD CHARACTERISTICS AND CORPORATE ENVIRONMENTAL PERFORMANCE IN CHINA

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Universiti Utara Malaysia

DOCTOR OF PHILOSOPHY
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2026

THE MODERATING EFFECT OF SLACK RESOURCES ON THE RELATIONSHIP BETWEEN BOARD CHARACTERISTICS AND CORPORATE ENVIRONMENTAL PERFORMANCE IN CHINA

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A thesis submitted to the Ghazali Shafie Graduate School of Government Universiti Utara Malaysia in fulfilment of the requirement for the Degree of Doctor of Philosophy

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ABSTRACT

Under the guidance of the “dual carbon” goal, improving corporate environmental performance (CEP) has become a core driver in promoting the sustainable development of enterprises. However, such improvement cannot be achieved overnight and is influenced by multiple factors. The main objective of this study was to examine how slack resources moderate the relationship between the characteristics of Chinese corporate boards of directors and CEP, as well as to assess the significance of this moderating effect on the enhancement of CEP. This study employed a questionnaire survey and the sample was selected using a simple random sampling method. The data were collected from senior managers of manufacturing firms in Guangdong Province, China. A total of 478 complete and valid responses were obtained and the research hypotheses were tested using Partial Least Squares Structural Equation Modelling (PLS-SEM). The findings indicated that board independence, board size, board interlocks, and board diversity are positively and significantly associated with CEP, whereas Chief Executive Officer (CEO) duality was significantly and negatively related to CEP. Furthermore, unabsorbed slack resources significantly strengthen the positive effects of board independence and board gender diversity on CEP, while partially mitigating the negative impact of CEO duality. However, their moderating effects on the relationships between board size, board interlocks, and CEP were not significant. By contrast, the influence of absorbed slack resources appeared to be more complex, whereby it significantly enhanced the positive association between board interlocks and CEP, yet intensified the negative effect of CEO duality. Moreover, absorbed slack resources exhibited no significant moderating effects on the relationships between board independence, board size, or board gender diversity and CEP. Theoretically, this study contributed to the use of the Resource-Based View (RBV) theory in studying the context of characteristics of Chinese corporate boards and slack resources in enhancing the CEP in China. From a practical point of view, the results offer different perspectives to managers and policymakers in optimising corporate resource allocation, leveraging the positive effects of different types of slack resources, and ultimately promoting improvements in corporate environmental performance.

Keywords: Corporate Environmental Performance, Board Characteristics, Slack Resources

ABSTRAK

Di bawah kerangka matlamat "dwi karbon", peningkatan prestasi alam sekitar korporat (CEP) telah menjadi pemacu utama dalam mempromosikan pembangunan perusahaan yang mampan. Namun, pencapaian prestasi tersebut bukanlah sesuatu yang dapat direalisasikan dalam jangka masa singkat dan dipengaruhi oleh pelbagai faktor. Objektif utama kajian ini adalah untuk mengkaji peranan penyederhanaan sumber lebihan *(slack resources)* dalam hubungan antara ciri-ciri lembaga pengarah syarikat di China dan CEP, serta menilai kepentingan kesan penyederhanaan tersebut terhadap peningkatan CEP. Kajian ini menggunakan tinjauan soal selidik dan sampel dipilih menggunakan kaedah persampelan rawak mudah. Data dikumpul di kalangan pengurus kanan syarikat firma pembuatan yang beroperasi di Wilayah Guangdong, China. Sebanyak 478 respons yang lengkap dan sah telah diperoleh dan hipotesis kajian diuji menggunakan kaedah *Partial Least Squares Structural Equation Modelling* (PLS-SEM). Dapatan kajian menunjukkan bahawa kebebasan lembaga, saiz lembaga, jaringan antara lembaga *(board interlocks)*, serta kepelbagaian jantina lembaga *(board gender diversity)* mempunyai hubungan positif dan signifikan dengan CEP. Manakala dwi-peranan Ketua Pegawai Eksekutif (CEO) didapati mempunyai hubungan negatif yang signifikan dengan CEP. Tambahan pula, pengaruh sumber lebihan tidak terserap didapati memperkukuh kesan positif kebebasan lembaga dan kepelbagaian jantina lembaga terhadap CEP, di samping sebahagiannya mengurangkan kesan negatif dwi-peranan CEO. Walau bagaimanapun, kesan penyederhanaan bagi hubungan antara saiz lembaga, jaringan lembaga dan CEP adalah tidak signifikan. Sebaliknya, sumber lebihan terserap menunjukkan kesan yang lebih kompleks, di mana ia meningkatkan hubungan positif antara jaringan lembaga dan CEP, namun pada masa yang sama mengukuhkan kesan negatif dwi-peranan CEO. Selain itu, sumber lebihan terserap juga tidak menunjukkan kesan penyederhanaan yang signifikan terhadap hubungan antara kebebasan lembaga, saiz lembaga atau kepelbagaian jantina lembaga dengan CEP. Secara teorinya, kajian ini menyumbang kepada penggunaan teori *Resource-Based View* (RBV) dalam mengkaji konteks ciri-ciri lembaga korporat China dan sumber kelonggaran dalam meningkatkan CEP di China. Dari sudut pandangan praktikal, keputusan ini menawarkan perspektif yang berbeza kepada pengurus dan pembuat dasar dalam mengoptimumkan peruntukan sumber korporat, memanfaatkan kesan positif pelbagai jenis sumber kendur, dan akhirnya menggalakkan peningkatan dalam prestasi alam sekitar korporat.

Kata Kunci: Prestasi Alam Sekitar Korporat, Ciri-ciri Lembaga Pengarah, Sumber Lebihan

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LIST OF ABBREVIATIONS

BOD	Board of Directors
BTOF	The Behavioral Theory of the Firm
CEO	Chief Executive Officer
CEP	Corporate Environmental Performance
CPC	The Communist Party of China
CS	Rcorporate Social Responsibility
CSRC	China Securities Regulatory Commission
EDGAR	Electronic Data Gathering, Analysis and Retrieval
ISAR	International Standards of Accounting and Reporting
ISO	International Standards Organization
MPIs	Management Performance Indicators
OPIs	Operational Performance Indicators
TMT	Top Management Team
WBCSD	World Business Council for Sustainable Development
WCED	World Commission on Environment and Development

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CHAPTER ONE

INTRODUCTION

This chapter outlines the background of present research by examining the development of the Chinese economy and its role in fostering the growth of many organizations. It also introduces the research questions drawn from the problem statement and the objectives of the study. Additionally, the chapter concludes by discussing the significance and limitations.

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1.1 Background of the Study

Against the backdrop of an escalating global environmental crisis, challenges such as climate change, resource depletion, and ecological degradation have emerged as critical constraints to the sustainable development of economies and societies. In 2015, the United Nations adopted the 2030 Agenda for Sustainable Development, which introduced the Sustainable Development Goals (SDGs), emphasizing the need to promote green, low-carbon, and inclusive development on a global scale to achieve harmonious coexistence between humanity and nature (United Nations, 2015).

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APPENDICES

Appendix A
Survey Questionnaire

Research Title: The Moderating Effect of Slack Resources on the Relationship between Board Characteristics and Corporate Environmental Performance

Objective: Determine the influence of board characteristics on CEP

Target Respondents: Organizational Managers

Dear Respondent,

I am a Ph.D. International Studies postgraduate student from the Universiti Utara Malaysia (UUM), currently carrying out a survey on the aforementioned title. The questions in this booklet are intended to capture the average situation of firms between 2021 and 2023. Questions in this booklet are intended to be asked of you. Your kind and precise objective response would be highly appreciated, as it will significantly contribute toward achieving the purpose of the research. Confidentiality of your response is hereby guaranteed and your responses will be used purely for academic purposes.

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In case of any enquiries, please feel free to contact the researcher on the following mobile numbers:

Student Name: Yao Cuihong

Mobile Number: 15875887989

Thank you!

PART ONE: Personal Information

1. What is your gender?

☐ Male ☐ Female

2. Your age?

☐ ≦30 years ☐ 31-40 years

☐ 41-50 years ☐ 51-60 years ☐ ⩾61 years

3. What is your highest educational level?

☐ High school and below ☐ Junior college

☐ Bachelor ☐ Master ☐ Ph.D.

4. What is your current position in your company is?

☐ CEO ☐ Director ☐ General manager

☐ Operation manager ☐ Other (Please Specify)

5. How many years have you been working in your company?

☐ ≦5 years ☐ 6-10 years

☐ 11-20 years ☐ 21-30 years ☐⩾31 years

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PART TWO: Basic Information of the Enterprise

1. How many years has your company been established?

☐ ≦5 years ☐ 6-10 years

☐ 11-15 years ☐16-20 years ☐ ⩾21 years

2. What is the type of registration in your company?

☐ State-owned enterprise

☐ Private enterprise

☐ Chinese-foreign joint venture

☐ Wholly foreign-owned enterprise

☐ Other

3. What is the current number of employees in your company?

☐≦100 ☐ 101-500 ☐ 501-1000

☐1001-1500 ☐ 1501-2000 ☐ ⩾2001

4. What is the average asset-liability ratio (asset-liability ratio = total liabilities/total assets ×100%) of your company in the past three years?

☐ ≦30% ☐ 30% and ⩽40%

☐ >40% and ⩽50% ☐ >50% and ⩽60% ☐ >60%

5. What is the average return on assets of your company in the past three years (return on assets = net profit/average total assets ×100%)?

☐≦0 ☐ >0 and ⩽5% ☐ >5% and ⩽10%

☐ >10% and ⩽15% ☐ >15% and ⩽20% ☐ >20% and ⩽25%

☐ >25% and ⩽30% ☐ >30%

6. Which of the following categories does your business belong to?

☐ Heavy polluting industry

☐ Non-heavy polluting industry

(Based on September 14, 2010, released by the Ministry of the Environment information disclosure of listed companies guide (draft) heavy pollution industry includes: thermal power, steel, cement, electrolytic aluminium, coal, metallurgical, chemical, petrochemical, building materials, paper making, brewing, pharmaceutical, fermentation, textile, leather and mining, and other 16 sectors).

7. The registration place (city) of your company is:

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PART THREE: Basic Information of the Board of Directors

1. What is the number of directors in your company?

☐ ≦3 ☐ 4-6

☐ 7-9 ☐ 10-12 ☐ ⩾13

2. What is the average number of years that board members of your company have served on the board?

☐ ≦3 years ☐ 4-6 years

☐ 7-9 years ☐ 10-12 years ☐ ⩾13 years

3. What is the percentage of members of the board of directors of your company who are part-time members of the board of directors in other companies?

☐ ≦10% ☐ >10% and ⩽20%

☐ >20% and ⩽30% ☐ >30% and ⩽40% ☐ >40%

4. What is the percentage of female directors in your company?

☐ ≦5% ☐ >5% and ⩽10%

☐ >10% and ⩽15% ☐ >15% and ⩽20% ☐ >20%

5. What is the percentage of independent directors in the total number of the board of directors in your company?

☐ ≦30% ☐ >30% and ⩽40%

☐ >40% and ⩽50% ☐ >50% and ⩽60% ☐ >60%

6. Is the position of the board chair held by the Chief Executive Officer (CEO) in your company?

☐ YES ☐ NO

7. What is the number of shares held by the members of the board of directors in your enterprise as a percentage of the total number of outstanding common shares?

☐ ≦5% ☐ >5% and ⩽10% ☐ >10% and ⩽15%

☐ >15% and ⩽20% ☐ >20% and ⩽25% ☐ >25% and ⩽30%

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☐ >30%

8. What is the average age of the board members in your company?

☐ ≦30 years ☐ 31-40 years

☐ 41-50 years ☐ 51-60 years ☐ ⩾61 years

PART FOUR: Corporate Environmental Performance, Enterprise Slack Resources, and Financial Situation

Please tick the box that you most agree with according to the actual situation of your company and the following statement. On a scale of 1 to 7, indicate the extent to which you agree with each statement:7 represents "strongly agree", 6 – "agree", 5 – "slightly agree", 4 – "neutral", 3 – "slightly disagree", 2 – "disagree", and 1 – "strongly disagree." A higher score indicates a higher level of agreement.

Table 1

The Measurement of Corporate Environmental Performance

Number	Content presented	Strongly disagree → Strongly agree						
1	My company can effectively reduce the emissions of "three wastes".	1	2	3	4	5	6	7
2	My company can effectively reduce the consumption of harmful/toxic substances.	1	2	3	4	5	6	7
3	My company can make efficient use of energy/resources.	1	2	3	4	5	6	7
4	My company can reduce the frequency of environmental accidents.	1	2	3	4	5	6	7
5	My company is in compliance with environmental regulations.	1	2	3	4	5	6	7
6	My company has provided employees with education and training related to environmental protection and safety.	1	2	3	4	5	6	7
7	My company can improve the corporate environmental image.	1	2	3	4	5	6	7

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Table 2

The Measurement of Unabsorbed Slack

Number	Content presented	Strongly disagree → Strongly agree						
1	My company has enough financial resources to deal with emergent investment demands.	1	2	3	4	5	6	7
2	My company's retained earnings are enough to meet market demands.	1	2	3	4	5	6	7
3	My company has much potential social relationship to use.	1	2	3	4	5	6	7
4	My company can obtain bank loans or other financial funding when needed.	1	2	3	4	5	6	7

Table 3

The Measurement of Absorbed Slack

Number	Content presented	Strongly disagree → Strongly agree						
1	My company's equipment and technologies are advanced but underused.	1	2	3	4	5	6	7
2	The potential talent resources have not been fully developed.	1	2	3	4	5	6	7
3	My company's current capacity is lower than the designed level.	1	2	3	4	5	6	7

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Appendix B

Small-Scale Pretest Results

Table B1

Descriptive Statistics of Board Characteristics in Small-Scale Pretest(n = 61)

Variable	Category	Frequency	Percentage (%)
Board Independence	≦30%	11	18.
	>30% and ≤40%	22	36.1
	>40% and ≤50%	16	26.2
	>50% and ≤60%	11	18
	>60%	1	1.6
	Total	61	100.00
CEO Duality	YES	41	67.2
	NO	20	32.8
	Total	61	100.00
Board Size	≦3	11	18
	4-6	20	32.8
	7-9	16	26.2
	10-12	11	18
	≥13	3	4.9
	Total	61	100.00
Board Interlocks	≦10%	9	14.8
	>10% and ≤20%	23	37.7
	>20% and ≤30%	13	21.3
	>30% and ≤40%	13	21.3
	>40%	3	4.9
	Total	61	100.00
Board Gender Diversity	≦5%	12	19.7
	>5% and ≤10%	16	26.2
	>10% and ≤15%	17	27.9
	>15% and ≤20%	9	14.8
	>20%	7	11.5
	Total	61	100.00

Source: Field Survey (2025)

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Table B2

Descriptive Statistics of Control Variables in Small-Scale Pretest(n = 61)

Variable	Category	Frequency	Percentage (%)
Firm Size	≦100	6	9.8
	101-500	11	18
	501-1000	12	19.7
	1001-1500	7	11.5
	1501-2000	1	1.6
	≥2001	24	39.3
	Total	61	100.00
Firm Leverage	≦30%	37	60.7
	30% and ≤40%	14	23
	>40% and ≤50%	9	14.8
	>50% and ≤60%	1	1.6
	>60%	0	0
	Total	61	100.00
Firm Performance	≦0	0	0
	>0 and ≤5%	2	3.3
	>5% and ≤10%	9	14.8
	>10% and ≤15%	11	18
	>15% and ≤20%	17	27.9
	>20% and ≤25%	9	14.8
	>25% and ≤30%	6	9.8
	>30%	7	11.5
	Total	61	100.00

Source: Field Survey (2025)

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Table B3

R^2 Values and Corresponding f^2 from Small-Scale Pretest (n = 61)

Dependent Variable	R^2	R^2 adjusted	f^2
CEP	0.678	0.517	1.07

Note: $f^2 = R^2 / (1 - R^2)$. Results are based on a small-scale pilot sample (n = 61) and are provided for reference only. These estimates were not used for formal sample size calculation.

Source: Field Survey (2025)

Appendix C

Hypothesis Testing Results

Table C1

Hypothesis Testing Results

	Hypotheses	Result
H1	Board independence has positive influence on corporate environmental performance（CEP）.	**Supported**
H2	CEO duality has a negative influence on corporate environmental performance（CEP）.	**Supported**
H3	Board size has a positive effect on corporate environmental performance（CEP）.	**Supported**
H4	Board interlocks have a positive effect on corporate environmental performance（CEP）.	**Supported**
H5	Board gender diversity has a positive effect on corporate environmental performance (CEP) .	**Supported**
H6a	Unabsorbed slack resources positively moderate the relationship between board independence and corporate environmental performance (CEP), such that the relationship is stronger when unabsorbed slack is higher.	**Supported**
H6b	Absorbed slack resources negatively moderate the relationship between board independence and corporate environmental performance (CEP), such that the relationship is weaker when absorbed slack is higher.	Not Supported
H7a	The negative effect of CEO duality on corporate environmental performance (CEP) is mitigated when unabsorbed slack is high.	**Supported**
H7b	The negative effect of CEO duality on corporate environmental performance (CEP) is exacerbated when absorbed slack is high	**Supported**
H8a	The positive effect of board size on corporate environmental performance (CEP) is strengthened when unabsorbed slack is high.	Not Supported
H8b	The positive effect of board size on corporate environmental performance (CEP) is strengthened when absorbed slack is high.	Not Supported
H9a	The positive effect of board interlocks on corporate environmental performance (CEP) is strengthened when unabsorbed slack is high.	Not Supported
H9b	The positive effect of board interlocks on corporate environmental performance (CEP) is strengthened when absorbed slack is high.	**Supported**
H10a	The positive effect of board gender diversity on corporate environmental performance (CEP) is strengthened when unabsorbed slack is high.	**Supported**
H10b	The positive effect of board gender diversity on corporate environmental performance (CEP) is strengthened when absorbed slack is high.	Not Supported

Source: Field Survey (2025)

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