EFFECT OF GREEN HUMAN RESOURCE MANAGEMENT ON CORPORATE ENVIRONMENTAL PERFORMANCE: THE MEDIATING ROLE OF GREEN INNOVATION AND ORGANIZATIONAL CITIZENSHIP BEHAVIOR IN CHINESE TELECOM ENTERPRISES

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A dissertation submitted in partial fulfillment of the requirements for the degree of

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DECLARATION

I, Haiyun Chen, hereby certify that the work embodied in this dissertation entitled "Effect of green human resource management on corporate environmental performance: The Mediating Role of green innovation and organizational citizenship behavior in Chinese Telecom Enterprises" was the result of original research and had not been submitted for a higher degree to any other university or institution.

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DISSERTATION APPROVAL

Graduate School, Siam University

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Title **Effect of Green Human Resource Management on Corporate Environmental Performance: The Mediating Role of Green Innovation and Organizational Citizenship Behavior in Chinese Telecom Enterprises**

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ABSTRACT

Title : Effect of green human resource management on corporate environmental performance: The Mediating Role of green innovation and organizational citizenship behavior in Chinese Telecom Enterprises

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This study examined how green human resource management (GHRM), green innovation (GI), and organizational citizenship behavior (OCB) affect corporate environmental performance (CEP) in Chinese telecommunication enterprises, and tested whether GI and OCB mediate the relationship between GHRM and CEP.

A mixed-methods design was used: a quantitative survey of 369 employees from multiple Chinese telecommunication companies, and qualitative semi-structured interviews with managers and staff.

Quantitative results showed that GHRM, GI, and OCB each had significant positive effects on CEP, with GI exerting the strongest direct influence. OCB contributed to CEP both directly and indirectly by promoting GI. The effect of GHRM on CEP was largely mediated through OCB and GI, indicating that HR practices primarily improve environmental outcomes by fostering voluntary pro-environmental behavior and innovation. Qualitative findings corroborated and enriched the quantitative results, revealing that sustainability-aligned recruitment, training, performance appraisal, and incentives cultivate an environmental responsibility culture and enable

employee participation in green innovation. Together, the findings highlight the synergistic mechanism by which strategic HR practices, employee voluntary behaviors, and innovation jointly enhance environmental performance. The study contributes to theory by clarifying mediation pathways and offers practical implications for telecommunication firms seeking to improve sustainability through integrated HR and innovation strategies.

Keywords: green human resource management, corporate environmental performance, green innovation, organizational citizenship behavior

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CHAPTER 1
INTRODUCTION

1.1 Background of the Study

The telecom industry probably arose after 1990, and the middle had gone from the analogy mobile phone era, the 2G networks era, the 3G networks era, the 4G networks era, and now it was the 5G networks era. The iteration and update of telecom technology had made our mobile phones from being able to support phone calls to supporting the Internet era, and to the VoLTE voice era, our monthly mobile phone use traffic from 1MB to 1GB, and now even 100GB or more (Li et al., 2023). Different networks have different base stations and hardware equipment, and the iteration of network technology was bound to replace the hardware equipment, remove the old equipment, and then eliminate it as waste products, and the new equipment was produced and installed on the base station, which needs to spend more steel, chips, integrated equipment (Niazi et al., 2023).

People all over the planet have also entered the age of digital technology. People across the globe have also entered the age of globalized digital technology (Ren et al., 2018). In today's digital era of globalization, telecommunication technology (TT) had been considered because that contributes to various sectors of an economy and increases economic growth; however, Iteration and update of TT influence environmental quality which needs attention. Khan et al. (2022) pointed out that TT increases carbon dioxide emissions.

In China, China Unicom, China Telecom, and China Mobile were the three state-owned telecom enterprises providing communication services to the Party, government bodies, military organizations, various sectors, and the general public. They are the fundamental, pillar, strategic, and leading roles in the national economy (Shao et al., 2019). Over the years, they all have been striving to strengthen overall planning for energy conservation and emission reduction.

Chinese telecom enterprises created a station intelligent energy-saving system to settle the problems of high energy consumption. They took the technology innovations including increased independent research and development, and used AI, big data technology, and automatic control technology. By the end of 2020, the system has been applied and 350,000 4G sectors and 104,000 5G sectors have been deployed nationwide (Weili et al., 2022). The average daily comprehensive energy-saving efficiency was more than 12.5%. The annual electricity was saved 95.3 million KWH, equivalent to 61.94 million yuan in electricity costs. The carbon dioxide emissions had been reduced by 95,000 tons (Li et al., 2023). Reducing costs and increasing efficiency help enterprises improve social resource efficiency. China Telecom has adopted a green environment strategy, purchased environment-friendly communication equipment, worked with suppliers to combat climate change, and implemented the green human resource management system.

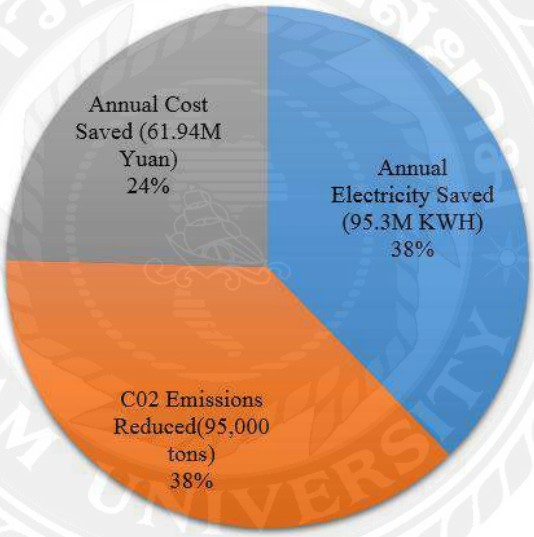

Figure 1.1 Energy Savings, Cost Reduction, and CO2 Emissions Reduction
Source: Weili et al. (2022)

In the procurement process, China Telecom uses green procurement indicators, incorporates environmental impact factors into the procurement project score, and introduces environmental assessment standards such as ISO14000 environmental management system certification, government environmental assessment report, and the list of "green factories" of the Ministry of Industry and Information Technology (Weili et al., 2022); In the production process, China Telecom conducts environmental identification and control of products that may have environmental risks, rejects products that do not meet environmental requirements, and promotes suppliers to enhance their awareness and ability of environmental protection. In

the screening of suppliers, the content of whether the production waste was green-treated and discharged according to the standard, environmental assessment report, and environmental monitoring report were included in the assessment scope (Xu et al., 2018). In the evaluation of suppliers' supply capacity, corporate social responsibility (including energy conservation and emission reduction) was included in the evaluation index system. In the process of management of suppliers' bad behaviour, the adverse impact of suppliers due to environmental problems was included in the "serious bad behaviour" management, and according to the situation, disciplinary measures such as downgrade, reduction of shares, cancellation of shares, restriction of procurement, and prohibition of procurement was taken.

The telecommunication industry has made significant technological progress and expanded its market share driving technological iteration and network construction. However, its environmental costs and governance bottlenecks have gradually emerged. As the world's largest 5G network coverage country, China has built more than 2.937 million 5G base stations by June 2023, accounting for over 60% of the global total. Behind this achievement, however, lies a tremendous environmental cost. The rapid deployment of 5G networks has led to a significant shortening of the hardware replacement cycle, with the average service life of 4G base stations reduced from 10 years to 5 years, generating more than 500,000 tons of electronic waste annually. The energy consumption problem of 5G base stations was also becoming increasingly severe, with the power consumption of a single 5G base station being three times that of a 4G base station. In 2022, the total electricity consumption of the telecommunications industry reached 216 billion kWh, accounting for 2.3% of the total electricity consumption in the country. The demand for rare earth metals required for 5G network construction increased by 300% compared to 4G, and the annual consumption for base stations exceeds 8 million tons (Li et al., 2023). These quantified environmental costs reveal the significant challenges the telecommunications industry faces in its green transformation process.

Telecommunications companies have also engaged in some proactive efforts in green management, through technological innovations aimed at reducing emissions and improving efficiency. China Mobile's "Minimalist Site" design has reduced steel usage by 30%, while China Telecom have implemented an AI energy-saving system to adjust energy consumption (Weili et al., 2022). Telecommunications companies have also provided industrial internet solutions for the manufacturing sector through digital means, helping clients reduce their carbon intensity by an average of 18.6% (Li et al., 2023). In circular economy practices, the

three major operators have reduced redundant construction by building shared base stations. In 2022, the number of shared base stations reached 840,000, reducing the rate of repeated construction of towers by 40% (Li et al., 2023). The innovations in green technology and services have brought certain environmental benefits to the telecommunications industry. However, there were structural deficiencies in the environmental governance system, particularly the imbalance between hardware procurement and human resource investment. In 2022, equipment procurement accounted for 72% of the investment, while human resource investment was less than 5%, leading to a lack of environmental awareness and participation (Niazi et al., 2023).

Surveys show that the environmental awareness among employees of the three major operators was generally low, with only 34% of employees being aware of the company's dual-carbon goals. In environmental performance evaluations, the average weight of environmental KPIs at branch offices was only 6.8% (Li, et al., 2023), far below the weight of financial indicators. These issues reveal the lack of an effective green human resource management (GHRM) mechanism in the telecommunications industry as it drives its green transformation. Compared to the manufacturing sector, the telecommunications industry lags in GHRM, particularly in green recruitment, ESG training, green behaviour incentives, and cross-departmental collaboration. In manufacturing, about 68% of companies require applicants to have environmental skills, while only 22% of telecommunications companies have such requirements. Manufacturing employees participate in an average of 16 hours of ESG training per year, whereas telecommunications employees only receive 4.5 hours, leading to insufficient knowledge system updates (Li et al., 2023). In green behaviour incentives, 83% of companies in the manufacturing sector link them to performance evaluations, while only 31% of telecommunications companies do the same. Cross-departmental collaboration was 76% in manufacturing, but only 39% in the telecommunications industry. In 2021, China Telecom's energy-saving equipment utilization rate was only 65%, mainly because maintenance personnel lacked equipment optimization skills (Li et al., 2023).

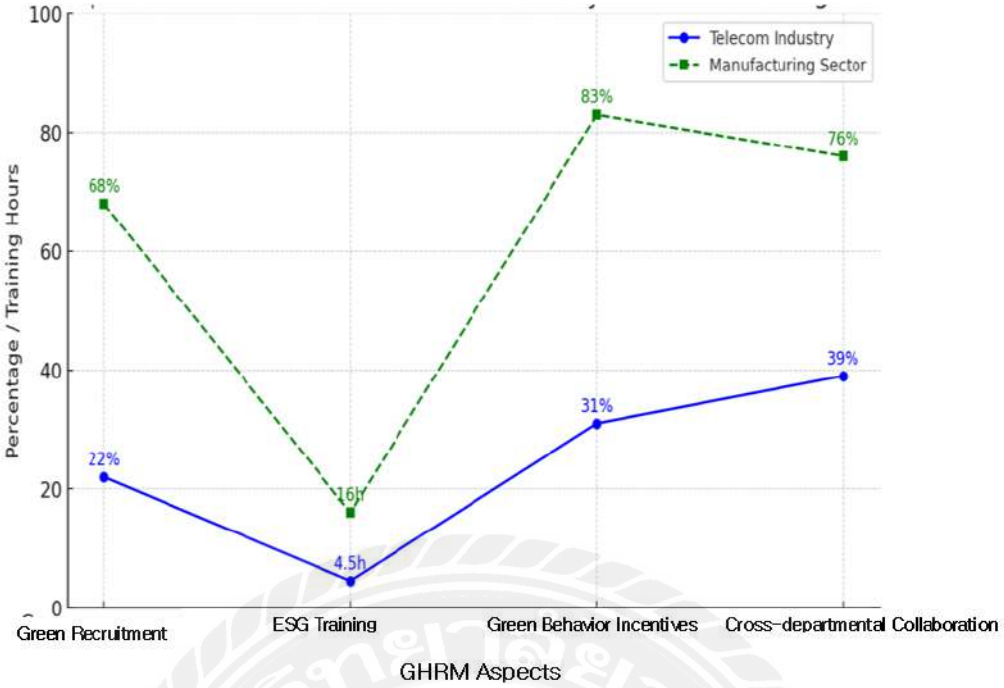

Figure 1.2 Comparison of GHRM between Telecom Industry and Manufacturing Sector
Source: Li et al. (2023)

As the telecommunications industry drives green transformation and enhances environmental performance, it was urgent to strengthen green human resource management (GHRM). GHRM enhances employees' knowledge promotes the implementation of green behaviours and fosters cross-departmental collaboration and innovation, thus more effectively driving green innovation and emission reduction. Therefore, telecommunications companies must increase investment in human resource management to advance Green technological and service innovations, improving employees' environmental literacy and participation, thereby achieving the goal of sustainable development.

Human resource management (HRM) is an important part of organization management activities. Through various functional activities of human resource management, people in the organization are implanted with the idea of responsibility. Resources are fully mobilized to assist enterprises in contextualized social responsibility activities (Shen & Zhu, 2011). How to integrate green behaviours into the organization’s operations. Dost et al. (2019) suggested that the cross-functional distribution of green ideologies can assist in addressing these challenges. Pinzone’s research results show that ‘Green’ HRM practices were conducive to voluntary behaviours towards the environment at the collective level. Moreover, employees' willingness

to support their organization in its EM endeavour partially mediates this relationship (Pinzone et al., 2016; Xu et al., 2018).

According to the resource-based theory, combining human resource management with environmental management can promote the sustainable development of enterprises. The effective implementation of the environmental management system can only be achieved by employing staff with appropriate skills in suitable positions. Green human resource management provides enterprises with employees with ecological responsibility and capability. These employees can help enterprises use existing resources and minimize their carbon footprint. Green human resource management was conducive to promoting the implementation of environmental policies (Li et al., 2023).

Though telecommunication enterprises are not manufacturing companies, they have important obligations to improve sustainable performance, take measures to reduce carbon emissions, save resources, and promote green. Telecommunication enterprises can help other industries achieve energy conservation and emission reduction by providing digital solutions to promote the development of a low-carbon economy. The social, economic, and environmental are the three dimensions of the organization's responsibilities. Organizations are engaged in environmental corporate social responsibility to maintain their high speed of sustainable development and reduce the adverse effects of global warming (Li, et al., 2023).

In recent years, Chinese telecom enterprises have carried out work to improve environmental performance in the following three aspects (Li et al., 2023). First of all, there are four aspects of environmental protection measures in network construction. First, take measures to protect cultivated land. When the base station was selected, priority should be given to wasteland, and in principle, no newly cultivated land should be occupied. Secondly, equipment pollution measures should be taken to preferentially select equipment with no noise, no electromagnetic radiation, and no pollutants. Third, take measures to reduce the impact of construction, in the field of communication route survey, take the initiative to avoid mineral deposits, forests, grasslands, wildlife, natural relics, human relics, nature reserves, scenic spots, and other areas, laying optical cables, try to avoid changing the surrounding environment; Fourth, take measures to reduce electromagnetic radiation emission, actively use advanced technical means, do a fine job of base station layout, and ensure that electromagnetic radiation indicators were better than national standards (Awwad Al-Shammari et al., 2022).

China Unicom's services support green HRM by promoting digital transformation and reducing waste. For example, its mobile services push eSIM tech to cut plastic waste and encourage digital communication to lower paper use. Broadband and fixed-line services back remote work, reducing commuting, and drive paperless operations via cloud communication. Enterprise solutions offer cloud computing and AI analytics to optimize energy use in HR and digital platforms to cut paper processes. International services provide global cloud-network integration to cut physical travel and enable virtual HR collaboration. Solutions for workplace sustainability help build green offices with energy-efficient infrastructure.

Figure 1.3 China Unicom's services support Green HRM
Source: Researcher, 2025

Table 1.1 Relevance to Green HRM

Category	Relevance to Green HRM
Mobile Services	Promotes eSlM technology to reduce plastic waste from physical SlM cards. Encourages employees to adopt digital communication, reducing paper usage.
Broadband & Fixed-Line	Supports remote work with fiber-optic broadband reducing employee commuting and carbon footprint. Encourages paperless operations through cloud-based communication
Enterprise Solutions	Provides cloud computing and Al-driven analytics to optimize energy use in HR management. Enables digital HR platforms, reducing paper-based processes and improving efficiency.
International Services	Offers global cloud-network integration, reducing the need for physical travel and enabling virtual collaboration.
Smart Solutions	Develops smart city and industrial loT solutions that improve workplace sustainability. Helps companies implement green office environments through energy-efficient infrastructure.

Source: Researcher, 2025

Measures to promote green production and operation are as follows: First, launch an enterprise APP and WeChat mini program of the enterprise brand to realize customers' demands for placing orders, complaining, and paying fees in the APP and mini program of the

mall. Second, promote the digital operation of marketing, to achieve systematic unified management, and to achieve the management of the whole process.

In current green management practices, the interaction between green human resource management (GHRM) and green innovation (GI) are crucial; however, research on their interaction remains scarce (Seeck & Diehl, 2017; Alshammrei et al., 2022). While it is widely recognized that GHRM has a positive impact on corporate environmental performance, the synergistic effect between GHRM and GI, an important driver of environmental performance, has not been sufficiently explored. In recent years, an increasing number of studies have begun to focus on the distribution of green management across various functional areas, examining the interrelationships and synergistic effects (Li et al., 2023).

Furthermore, although existing literature emphasizes the positive impact of GI on environmental performance, particularly in terms of energy conservation, emissions reduction, and resource optimization, GHRM as an internal driving force for promoting green innovation had often been overlooked (Goh et al., 2020). GHRM was not limited to recruiting employees with environmental awareness but also encourages employees to propose green innovation ideas and solutions through incentive mechanisms, thereby further promoting the development and application of green technologies. The integration of GHRM and GI helps companies better address environmental challenges, enhances their environmental responsibility and social impact, and thus provides solid support for their sustainable development.

The measures to comply with green office standards include advocating water conservation, treating sewage discharge, promoting the recycling of production water, and conducting regular inspections and maintenance of the entire water supply system. It is also imperative to promote research offices by significantly reducing research usage in operations and fully embracing electronic invoices, electronic reimbursements, and electronic research operations. In addition, the direct connection of tax-filing enterprises to tax authorities should be promoted to reduce the use of research documents. Furthermore, a “green enterprise energy consumption big data platform” should be deployed to detect electricity consumption of various equipment and office facilities. Finally, a campaign against food and beverage waste should be launched, allowing employees to use WeChat mini-programs to order food and thereby reduce waste.

In recent years, China Telecom has taken multiple measures to improve its environmental performance, covering network construction, green production, and operation to green office work. However, judging from these initiatives, the company seems to have overlooked the role of green human resource management (GHRM), which is a crucial aspect that cannot be ignored. GHRM integrates environmental protection concepts into recruitment, training, performance appraisal, and employee engagement, enabling enterprises to establish a more comprehensive green management system while enhancing environmental performance, thereby promoting sustainable development (Shao et al., 2019). China Telecom is deficient in its attention and measures towards GHRM. Throughout the recruitment process, the company overlooks the importance of evaluating candidates' environmental awareness and proficiency in environmental management. Although many green measures have been implemented in production, operation, and office work, the effectiveness of these measures is limited if employees lack sufficient environmental knowledge and awareness (Xu et al., 2018). GHRM has emerged as a significant factor influencing China Telecom's environmental performance. China Telecom needs to focus on the role of green human resources in the company's environmental performance.

It is well known that green human resource management (GHRM) and green innovation (GI) have a positive impact on the environment; however, there have been few studies that investigate their interaction (Seeck & Diehl, 2017; Alshammrei et al., 2022). The relationship between these two functions needs to be further researched, Recent studies suggest how green management is distributed within various functional areas of an organization to examine concurrent results and the mutual relations among the functions (Li et al., 2023). There is more value in discussing the “green version” of human resource management (HRM) and innovation in the literature nowadays.

1.2 Significance of the Study

The research of green human resource management (GHRM) holds strategic importance for Chinese telecom enterprises by extending organizational practices and human resource management approaches to address environmental challenges. As China's telecom sector continues to experience rapid technological advancements, integrating green principles into operational and management strategies becomes essential for fostering sustainable development. The telecom industry faces mounting environmental pressures due to the expansion of 5G networks, increased energy consumption, and the disposal of obsolete

equipment. GHRM can help mitigate these impacts by embedding sustainability practices within the organization's core functions. By integrating the "green version" concept into recruitment, training, performance evaluation, and reward systems, GHRM empowers telecom enterprises to mobilize human, material, and financial resources more effectively to achieve environmental and business objectives.

Moreover, GHRM supports enterprises in cultivating employees' environmental awareness and knowledge, fostering a goodwill culture that aligns with international sustainability standards. This alignment not only strengthens a company's competitive edge but also aids in meeting global environmental compliance requirements. GHRM transforms sustainability strategies from simple corporate statements into actionable practices. Through targeted recruitment, GHRM helps attract talent with a strong environmental ethic, while training programs enhance employees' capabilities in green practices. Performance evaluations and incentive structures aligned with sustainability goals ensure consistent progress toward targets. This strategic integration facilitates the realization of a comprehensive sustainability framework, guiding telecom enterprises toward achieving environmental performance indicators alongside traditional financial metrics. Companies adopting GHRM practices can thus establish a sustainable corporate culture that fosters long-term stewardship.

Green innovation (GI) is another critical component emphasized in this research. GI involves practices such as waste recycling, pollution prevention, energy-saving initiatives, and the implementation of environmental management systems (Seeck & Diehl, 2017). Recognized as a strategic tool for achieving sustainable performance (Council et al., 1999), GI is a bridge linking GHRM to improved environmental and organizational outcomes. Previous studies have demonstrated that environmental strategies positively correlate with performance and moderate the relationship between GI and performance (Rehman et al., 2021). Singh et al. (2020) highlighted GHRM as a crucial driver of GI, while other studies explored factors such as corporate social responsibility (Irani et al., 2022), coordination capability, and dynamic green capabilities (Singh et al., 2022). Despite these findings, there remains a significant gap in the literature focusing on the indirect role of GI in the relationship between GHRM and environmental performance, particularly in the context of telecom enterprises.

Most existing empirical studies on GHRM and GI have concentrated on the manufacturing sector, overlooking the unique challenges and opportunities in service industries such as telecommunications. The telecom sector’s distinct characteristics—including high

energy demands, rapid technology turnover, and extensive infrastructure—require tailored green strategies. However, GHRM and GI in this sector remains largely unexplored. This study addresses this gap by providing empirical evidence on the role of GHRM and GI in enhancing environmental performance within telecom enterprises. This study expands the theoretical understanding of how human resource management practices can drive green innovation and sustainable outcomes. Furthermore, the research underscores the necessity of integrating GHRM and GI to align corporate operations with environmental ethics, ultimately promoting the sustainable development of telecom enterprises. In conclusion, this study holds practical and theoretical significance by offering insights into the role of GHRM and GI in addressing environmental challenges faced by telecom enterprises. By highlighting the need for a strategic and integrated approach to human resource management and green innovation, the research provides a pathway for telecom companies to achieve a harmonious balance between business growth and environmental sustainability.

1.3 Research Questions

(1) What is the effect of green human resource management (GHRM), green innovation (GI) and organizational citizenship behaviour (OCB) on corporate environmental performance (CEP) in Chinese telecommunication enterprises?

(2) What is the effect of green human resource management (GHRM) through green innovation (GI) and organizational citizenship behaviour (OCB) on corporate environmental performance (CEP) in Chinese telecommunication enterprises?

(3) How can corporate environmental performance be evaluated and guided in Chinese telecommunication enterprises?

1.4 Research Objectives

This study aims to investigate the effect of green human resource management (GHRM) on environmental performance (Social, environmental, economic) in Chinese telecommunication enterprises. To achieve this aim, the study seeks to focus on specific objectives:

(1) To explore the effects of green human resource management (GHRM), green innovation (GI) and organizational citizenship behaviour (OCB) on corporate environmental performance (CEP) in Chinese telecommunication enterprises.

(2) To explore the effects of green human resource management (GHRM) through green innovation (GI) and organizational citizenship behaviour (OCB) on corporate environmental performance (CEP) in Chinese Telecommunication Enterprises.

(3) To develop the corporate environmental performance (CEP) model for Chinese Telecommunication Enterprises.

1.5 Scope of the Study

1) Scope of Area

The subjects of this study were managers of three telecom enterprises (China Unicom, China Telecom, and China Mobile) in China.

2) Scope of Population

The population was limited to the managers of China's three telecommunications enterprises, which means that the research focused only on the employee groups of these three companies, rather than all industries in China or managers of other telecommunications enterprises. The population of this study was 1,098 managers of these three companies, not just a specific part of them (such as managers in a particular department or position) (163.com/dy/article/IR53TP930511N341.), nor was it limited to managers in a city or region. This study was conducted by randomly selecting the managers of the three telecom enterprises in China in the survey area to fill out the questionnaire as the survey sample for testing. A formal questionnaire survey was conducted after the completion of the test. The data collected in this study included managers' information including gender, age, marital status, education, monthly income, working experience, department, province, number of employees and company total income . The focus was on the managers of the human resource management department in telecom enterprises innovation management, environmental strategies, and environmental performance.

3) Scope of Content

This study focused on environmental performance, green human resource management, green innovation, and organizational citizenship behaviour.

Independent Variable: green human resource management.

Intermediate Variable: green innovation, organizational citizenship behaviour.

Dependent Variable: environmental performance.

4) Scope of Time

The time frame of the study was from January 2024 to September 2025.

1.7 Definition

Term	Definition
Green Human Resource Management (GHRM)	Green Human Resource Management (GHRM) means Human Resource Management (HRM) made by the environment "Green" or "Greening". It refers to using Human Resources Management (HRM) practices to reinforce sustainable practices. Integrating Environmental Management (EM) values into HR strategies to improve Environmental Performance (EP) and increase efficiencies. The aspects of GHRM are (a) caring for the environment, (b) protecting nature, (c) minimizing pollution, and (d) exploiting eco fields and natural human scenery. green human resource management involves the integration of an organization's environmental management objectives into the HR processes of recruitment & selection, training & development, performance management, evaluation, and reward.
Green Innovation （GI）	The practices focus on improving existing products and processes, making them environment-friendly. Selecting greener raw materials, avoiding waste, designing products using eco-design principles, reducing carbon emissions and footprints, and reducing consumption of water, electricity, and other raw materials were some avenues for GI.
Corporate Environment Performance (CEP)	Corporate environmental performance refers to the quantifiable outcomes of an organization's efforts to manage and reduce its impact on the natural environment. It involves assessing and improving the organization's use of resources, controlling pollution, and minimizing its ecological footprint.

Term	Definition
Organizational Citizenship Behavior （OCB）	Organizational citizenship behavior (OCB) refers to the voluntary actions and behaviors exhibited by companies that go beyond their legal obligations to contribute positively to society and the environment. These behaviors reflect the company's commitment to being a good corporate citizen, meaning they act in ways that were ethical, socially responsible, and beneficial to the broader community.
Green Organizational Citizenship Behavior (Green OCB)	Green organizational citizenship behavior (Green OCB) was defined as the voluntary, discretionary actions and behaviors exhibited by employees that go beyond their formal job requirements, aimed at promoting environmental sustainability within the organization. These behaviors include activities such as reducing energy consumption, minimizing waste, promoting eco-friendly policies, and educating colleagues on environmental practices, all with the goal of enhancing the company's environmental performance and supporting its sustainability objectives.
Chinese Telecom Enterprises （CTE）	Chinese Telecom Enterprises (CTE) refers to telecommunications companies based in China that provide telecommunication services, including mobile phone services, internet services, and broadband services. These enterprises were involved in the development, maintenance, and operation of telecommunications infrastructure and networks within China and globally. Prominent examples of Chinese Telecom Enterprises include China Mobile, China Unicom, and China Telecom.

Source: Researcher, 2025

1.8 Contribution of the Study

1.8.1 Theoretical Contribution

(1) This research studies the influence of GHRM on the social performance and environmental performance of enterprises, which makes up for the limitation that previous studies on GHRM only focus on organizational performance.

(2) This research creates a model to provide a comprehensive theoretical explanation framework for understanding the influence of the mechanism of GHRM on managers.

(3) This research studies the effects of green innovation on environmental performance and further explores the influence of GHRM practices on environmental performance in Chinese telecom enterprises.

1.8.2 Practical Contribution

(1) This research introduces a "green perspective" and integrates the theories related to green human resource management (GHRM) and green innovation (GI), discusses compliance

management, process management, enabling management and other management means, and the impact of GHRM on enterprises. So, it promotes the research of corporate GHRM at the micro-level further.

(2) The conclusions of this research play an important role in guiding enterprise managers to effectively carry out a model to prompt the performances in practice.

CHAPTER 2
LITERATURE REVIEW

This chapter systematically reviews the core concepts and internal relationships of green human resource management, green innovation, organizational citizenship behaviour, and corporate environmental performance. Based on relevant literature, it discusses influencing factors and current research, constructs a conceptual model, clarifies the operational definitions of key variables, and provides hypothesis rationales, laying a theoretical foundation for the selection of research methods and empirical analysis. The chapter is divided into 8 parts as follows:

2.1 Introduction

2.2 Review of Related Theories

2.3 Green Human Resource Management

2.4 Green Innovation

2.5 Organizational Citizenship Behaviour

2.6 Corporate Environmental Performance

2.7 Related Impact Studies

2.8 Conceptual Framework, Operational Definition, Hypothesis and Explanation of Hypothesis

2.1 Introduction

Currently, Chinese telecom enterprises exert more influence on social life. The responsibility of these enterprises in society had become prominent. Corporate social responsibility has become a topic of concern in business and theoretical circles. The performance of an organization in the environment under sustainable development is considered a critical success factor and links to its competitive advantage. To comprehend the environmental performance model for Chinese telecom enterprises, the research incorporates a

thorough literature review of relevant concepts and theories including Resource-based Views Theory (Barney & Arikan, 2005), Stakeholder Model (Fassin, 2008), and Ability-motivation-opportunity (AMO) Framework (Hughes, 2007).

The scope of green HRM practices is limited to implementing environmental initiatives and formulating and implementing policies and practices that encourage sustainable people management. HR functions have been claimed as the driver of green culture by aligning its practices and policies with sustainable objectives reflecting an eco-focus. Lately, scholars have given attention to the connection between green human resource management (GHRM) and environmental performance (Yu et al., 2020). Green-mindedness, employees' green behaviour, and research and development carried out in the enterprises are crucial sources for sustainability and GHRM (Siwei and Wongvanichtawee, 2023).

2.2 Review of Related Theories

2.2.1 Resource-Based Views Theory

Resource-Based View (RBV) is a theoretical framework for understanding how organizations achieve and sustain competitive advantage through the acquisition and management of valuable, rare, inimitable, and non-substitutable resources. The roots of RBV can be traced back to the works of Edith Penrose, who, in her seminal book The Theory of the Growth of the Firm (Penrose, 1959), emphasized the importance of firm-specific resources in determining the growth and competitive position of enterprises. Penrose (1959) argued that a firm's unique bundle of resources and capabilities influences its strategic choices and performance (Baumol, 1962; Penrose, 2009). Furthermore, Chester Barnard's (1938) work on organizational behavior and Philip Selznick's (1948) emphasis on distinctive competence also laid the groundwork for understanding the role of internal resources in achieving competitive advantage.

RBV has since become a pivotal theoretical framework in strategic management, explaining how enterprises leverage their internal resources to achieve and sustain competitive advantages. The cornerstone of the RBV posits that a firm's competitive advantage arises from its unique internal resources rather than from external market conditions. Within the context of sustainable environmental performance, the RBV emphasizes that an enterprise's internal resources and capabilities are the primary determinants of its success. These elements are

encapsulated in the VRIN framework, which highlights four key attributes of strategic resources: valuable, rare, inimitable, and non-substitutable (Barney, 1991).

RBV Theory gained prominence with the contributions of scholars like Birger Wernerfelt, who, in his 1984 article "A Resource-Based View of the Enterprise," explicitly articulated the idea that an enterprise's resources and capabilities were central to its strategy and performance (Wernerfelt, 1984). Wernerfelt's (1995) work provided a systematic approach to analyzing how resources contribute to an enterprise's competitive position. Jay Barney (1991) further advanced the RBV in his influential 1991 paper, where he identified the characteristics of resources that lead to sustained competitive advantage: valuable, rare, inimitable, and non-substitutable (VRIN). Barney's framework became a cornerstone of RBV theory and provided a clear set of criteria for evaluating the strategic importance of resources. Throughout the 1990s and 2000s, RBV theory continued to evolve, with researchers exploring various dimensions of resources and capabilities. Studies examined the dynamic capabilities of enterprises, which refer to their ability to adapt and reconfigure resources in response to changing environments (Eisenhardt & Martin, 2000). The RBV had been integrated with other strategic management theories, such as the Knowledge-Based View (KBV) and the dynamic capabilities framework, to provide a more comprehensive understanding of how enterprises leverage their resources for competitive advantage (Denford, 2013).

The Resource-Based Views Theory suggests that organizations seek to improve and harmonize their relationship with the external natural environment. The three types of distinct yet interrelated environmental strategies are pollution reduction, product stewardship, and sustainable development (Hart & Dowell, 2011). Barney (2001) described how human capital affects enterprises performance and these links have roots in the existing HRM and strategy literature. Enterprises with resource-based views examine how their ability to leverage their valuable, scarce, and difficult-to-imitate strategic resources may affect their competitive advantage and performance (Barney, 2001). In GHRM practices, employee behavior is proactively identified, developed, motivated, and extended for the enterprise’s sustained competitive advantage and superior performance based on RBV. The principles of the Resource-Based View (RBV) theory focus on the strategic importance of an enterprise's internal resources and capabilities in achieving and sustaining competitive advantage. The principles include resource heterogeneity, resource immobility, value creation, rarity,

inimitability, non-substitutability, organizational support, dynamic capabilities, path dependence, and competitive advantage.

2.2.2 Ability-Motivation-Opportunity (AMO) Theory

Traditional human resource management (HRM) focuses on the management of the organization to achieve its goals. The factors of traditional HRM encompass various functions and processes that were essential for maintaining an efficient and productive workforce. The key factors of traditional HRM include Recruitment and Selection, Training and Development, Performance Management, Compensation and Benefits, Employee Relations, Compliance and Legal Issues, and Succession Planning.

What is the difference between traditional human resource management and green human resource management? Renwick et al. (2013) argued that traditional human resource management (HRM) primarily focuses on managing people within organizations to maximize employee performance and contribute to achieving business goals. Its key areas include recruitment, training, performance management, compensation, and employee relations, with an emphasis on productivity, efficiency, and profitability. Green human resource management (GHRM) extends the traditional HRM focus by integrating environmental sustainability into HR practices. The objective is not only to manage people effectively but also to promote eco-friendly behaviors, reduce the organization's environmental impact, and contribute to sustainability goals.

The Ability–Motivation–Opportunity (AMO) theory suggests that employee performance is a function of their abilities (skills and knowledge), motivation (desire and willingness), and opportunities (context and resources to perform). HRM practitioners are encouraged to develop green human resource management (GHRM) practices that provide training (ability), incentives (motivation), and a conducive environment (opportunity) to support the implementation of environmental collaboration. Similarly, supply chain management (SCM) practitioners may enhance internal green supply chain management (GSCM) to strengthen the effects of GHRM (Yu et al., 2020).

Green human resource management (GHRM) practices refer to human resource policies and activities aimed at promoting environmentally sustainable practices within organizations. These practices integrate environmental management into HR functions, encouraging employees to adopt eco-friendly behaviors and contribute to the organization’s overall sustainability goals.

The Ability–Motivation–Opportunity (AMO) theory is a conceptual framework used to explain how human resource practices influence employee performance (Yu et al., 2020). According to this theory, employee performance is determined by three critical factors:

- Ability refers to the skills, knowledge, and competencies employees need to perform their job tasks. HR practices that enhance ability include recruitment and selection processes, training and development programs, and continuous learning opportunities (Yu et al., 2020).
- Motivation involves the desire and willingness of employees to exert effort and perform their duties. Motivation can be influenced by factors such as rewards and recognition, job satisfaction, intrinsic and extrinsic incentives, and performance management systems that align individual goals with organizational objectives (Yu et al., 2020).
- Opportunity pertains to the work environment and organizational context that allow employees to utilize their abilities and motivation. Providing opportunities means creating conditions that enable employees to participate in decision-making, offering the necessary resources and tools, and fostering a supportive and inclusive workplace culture.

The AMO theory posits that for employees to perform optimally, organizations must focus on enhancing their abilities through effective training and development, motivating them by implementing fair and transparent reward systems, and providing opportunities through a conducive work environment and adequate resources. By addressing these three components, organizations can improve employee performance, engagement, and overall organizational effectiveness (Yu et al., 2020).

Green intellectual capital can be regarded as both an organizational resource and a continually evolving dynamic capability. Enterprises can achieve a competitive advantage by strengthening the impact of green intellectual capital on green innovation, which, in turn, enhances environmental performance. This advantage is difficult for competitors to replicate. Furthermore, organizations can continually upgrade their competitive advantage by integrating the knowledge generated through green innovation management (GIM) into their GHRM practices, while simultaneously leveraging GHRM to enhance GIM.

Stakeholder theory, developed by R. Edward Freeman (1984), supports this perspective by emphasizing that companies should focus on the interests of all stakeholders, not just shareholders. These stakeholders include customers, employees, suppliers, communities, and the environment. In

this context, telecommunication enterprises must consider how to generate positive impacts on these various stakeholders while providing communication services (Alhaddi, 2015).

2.2.3 Social Identity Theory

To give meaning to environmental protection behavior, scholars claim that "green organizational identity" is a model of organizational identity concerning environmental management and green innovation that individuals in the company construct jointly. In the context of modern enterprises facing environmental challenges and pressures, green organization identification helps organization members take pro-environmental actions, thereby increasing organizational sustainable development capabilities and gaining competitive advantages (Siwei & Wongvanichtawee, 2023), The management of green transformation leadership strengthens the employees' sense of belonging to the environmentally friendly company, increasing efforts to encourage the adoption of environmentally friendly practices among staff members. Green organization recognition and understanding of the environment help staff members develop favorable management, motivate staff members to incorporate and apply new knowledge and fresh concepts in the field of green innovation, and then actively engage in green innovation behaviors aimed at satisfying the environmental needs of customers (Arulrajah et al., 2016; Hameed et al., 2020).

2.3 Green Human Resource Management

2.3.1 Definition of Green Human Resource Management

The definition of green human resource management (GHRM) was first put forward in 2008, thanks to integrating environmental management perspectives into the classical human resource management system (Renwick et al., 2008). green human resource management refers to a set of human resource management practices that can provide a high level of environmental sustainability, which was often reflected in environmental objectives at the organizational level (Do et al., 2019). Several studies on green human resource management have emerged, and scholars have put forward many conceptual elements for its concrete manifestation. The research of green human resource management mainly focuses on two levels. The first was to examine how green human resource management can affect employee performance from a relatively micro perspective, that is, green human resource management practices. The second level mainly focuses on how enterprises use green human resource management as a management tool to help enterprises better achieve the strategic goal of environmental sustainability or improve competitive advantage, that is, green human resource management capability. In this study, the definition of green human resource management

was reduced to the training and supervision mechanism provided for employees' green behaviors at the organizational level (Arulrajah et al., 2016; Hameed et al., 2020). green human resource management measures the level of human resource management adopted by enterprises to achieve environmental objectives.

Mandip (2012) believed that green human resource management was an organic combination of enterprise human resource management and environmental management. He also regards green human resource management as a supporting partner of enterprise environmental management and therefore had a strategic position. green human resource management encourages employees to recognize and practice green behaviors at work, further strengthens the concept of green environmental protection and sustainability in practice, improves the efficiency of green human resource management through employees' actions, and promotes the implementation of enterprise environmental management strategy (Gayathri & Karthikeyan, 2013).

Under the background of the transformation of social and economic development, human resource management should serve the strategy of enterprises and fully consider the sustainable development of social and economic and the realization of ecological and environmental benefits under the premise of "green and low carbon" (Hameed et al., 2020). Therefore, the theoretical basis of green human resource management should not only reflect the development trend of "green and low carbon" in the transition period of social and economic development mode but also reflect the thought of ecological harmony, internal and external harmony, interpersonal harmony and comprehensive and coordinated development. Green human resource management is defined as: based on the theories of green economy, low-carbon economy, harmonious management, and ecological human resource management, It solves the "non-green" and "non-harmonious" problems in previous human resource management (Hameed et al., 2020), such as not paying attention to environmental protection and harmonious development, through the construction of green human resource management system, to improve the internal and external environment and management concept of human resource management (Liu & Shi, 2013). Liu and Shi (2013) proposed that green human resource management should promote the transformation of enterprise human resource management from traditional functional management to systematic management, develop and cultivate talent with “green, low-carbon, and harmonious” values, rationally allocate human resources; and ultimately guide the macro-management of enterprises and organizations toward “green, low-carbon, and harmonious” development. This approach aims to shift economic growth from extensive growth to low-carbon, intensive growth, providing a new model of

human resource management for achieving sustainable social and economic development. The proposal of green human resource management is precisely in line with the transformation of the world from a post-industrial society to a knowledge economy society, from traditional extensive growth to low-carbon intensive growth. In the era of the knowledge economy, some new ideas of human resource management keep emerging. These new developments and changes are produced to actively adapt to the transformation of social and economic development mode, and the generation of these new ideas and theories had laid a theoretical foundation for green human resource management.

The emergence of the idea of green human resource management is not accidental. The development of social productive forces drives the change of economic development mode, and the change of economic development mode promotes the continuous development of human resource management theory (Renwick et al., 2008). The proposal for green human resource management is in line with the trend of the current social and economic development mode to green and low-carbon transformation. Under different economic forms, there are great differences in social production modes, and these differences promote the continuous development of human resource management theories. The proposal and development of green human resource management is precisely the human resource management theory to adapt to the changes in the development of social production mode driven by the transition to the era of knowledge economy (Do et al., 2019). The connotation of green human resource management can be understood from the following five aspects:

(1) Green human resource management emphasizes the characteristics of "green, low-carbon and harmonious", which was consistent with the "green and low-carbon" characteristics of the social and economic development mode in the era of the knowledge economy (Hameed et al., 2020).

(2) Green human resource management is a systematic approach to human resource management, which starts from the micro perspective of enterprises or organizations but focuses on the sustainable development of the social economy and the realization of ecological benefits at the macro level (Hameed et al., 2020).

(3) Green human resource management emphasizes the idea of "green, low-carbon, and harmonious" in the internal environment of human resource management and human resource management activities themselves without negating the functions of previous human resource management.

(4) Under the concept of green human resource management, the functional work such as talent development and training of enterprises is "green", while taking into account the economic and ecological benefits of enterprises, but also pay more attention to people-oriented, attention to the physical and mental health and comprehensive development of employees (Hameed et al., 2020).

(5) The micro goal of green human resource management is to promote the green and low-carbon development of enterprises to achieve economic, social, and ecological benefits, while the macro goal is to promote the transformation of social and economic development from traditional extensive growth to intensive growth, and finally achieve sustainable development.

2.3.2 Characteristics of Green Human Resource Management

(1) Greenness

The green characteristics of green human resource management are reflected in its focus on environmental and ecological issues and promote enterprises to establish ecological awareness and environmental awareness. Human resource management activities are based on the existence of enterprises, and the existence of enterprises cannot be separated from a certain social environment and natural environment (Mitta & Kaur, 2022; Mansoor et al., 2021; Ribeiro et al., 2022). Therefore, green human resource management must exchange information and materials with the social environment and ecological environment, and fully reflect the benefit goal of enterprises in the exchange process of information and materials. As far as traditional human resource management activities are concerned, their goal is to serve the economic benefits of enterprises, while in the context of green human resource management, ecological benefits, and social benefits are also included in the benefit goals of enterprises, such as requiring enterprises to bear more social responsibilities and ecological environmental protection responsibilities (Hameed et al., 2022). The greenness of green human resource management is also reflected in the optimal allocation and rational utilization of human resources (Karmoker et al., 2021). Green human resource management can realize the matching of people and posts, to give full play to the role of human resources.

(2) Low carbon

In the era of the knowledge economy, because of the change in human resource subjects, enterprise human resource management must turn to "people" as the center. Only by focusing on people and strengthening the management of knowledge workers, enterprises can possess more

knowledge and create greater economic, social, and ecological benefits relying on knowledge (Saeed et al., 2019). Green human resource management emphasizes that human resource management activities should effectively integrate the knowledge accumulation of knowledge workers, create a good working environment for knowledge workers, and promote knowledge workers to use their knowledge to create more benefits (Ahmad et al., 2021). Social and economic low-carbon growth requires enterprises to save energy and reduce emissions in production, sales, and other links as much as possible, while the ultimate goal of green human resource management was to promote the realization of low-carbon intensive economic and social growth, and the two were completely consistent in the ultimate goal (Lin et al., 2020). Under the concept of green human resource management, enterprises should not only advocate low-carbon and healthy office methods, but also fully fulfill their corporate social responsibilities, take measures to save energy and reduce emissions, reduce emissions, and protect the environment. It can be seen that green human resource management had the characteristics of low carbon.

(3) Harmony

The understanding of the harmonious characteristics of green human resource management can be developed from two aspects. On the one hand, from the perspective of the external development environment of the enterprise, the green and low-carbon characteristics of green human resource management determine that the implementation of green human resource management must exchange information, material, and energy with the social and natural environment of the enterprise (Hameed et al., 2022). This process of exchange is necessarily based on harmonious symbiosis with the social and natural environment. Whether it is the idea of sustainable development or the requirement of low-carbon growth, green human resource management advocates coordinated development, and this coordinated development is also a manifestation of green human resource management is harmonious. On the other hand, from the perspective of an enterprise's internal development environment, human resource management activities must be in a certain enterprise's internal environment (Saeed et al., 2019). At present, our country is promoting the construction of a harmonious society, and it also needs a harmonious environment within the enterprise. The harmony of the internal environment of the enterprise mainly includes the harmony between the enterprise and the employees and the harmony between the employees of the enterprise (Ahmad et al., 2021). The harmony between employees of enterprises should be based on people-oriented management under the guidance of "people-oriented" thought. This harmonious state refers to employees' mental health, high job satisfaction, and harmonious and stable interpersonal relationships among employees. The

harmony between enterprises and employees refers to the enterprise under the guidance of "people-oriented" ideology, through corporate culture and other measures to shape a healthy employee psychology, a positive work attitude, and a harmonious employee team (Lin et al., 2020). The harmony of green human resource management requires that the enterprise must have a healthy personality to ensure the health of the enterprise organism and promote the stable and sustainable development of the enterprise.

2.3.3 Theories and Concepts Relevant to Green Human Resource Management

Green human resource management measures the level of human resource management adopted by enterprises to achieve environmental objectives. Renwick et al. (2013) according to the AMO theory of Ability, Motivation, and Opportunity, developed a green, human resource management theoretical framework, It was believed that human resource management functions can have an impact on corporate environmental performance by improving employee capabilities, enhancing employee motivation and commitment, and providing employees with participation opportunities. In the recruitment process, employees with environmental awareness and environmental protection tendencies were recruited, and in the training process, employees were trained in environmental protection abilities. Through these two aspects, employees' green environmental protection ability was improved (Karmoker et al., 2021). The assessment of environmental behavior and environmental performance should be incorporated into performance appraisals. In addition, non-monetary rewards should be included in the compensation system, such as providing “green holidays” and granting awards to employees who are recognized as demonstrating the best environmental practices (Ahmad et al., 2021). These two steps can increase employee motivation and commitment to environmental protection. In the process of employee participation management, employees are encouraged to participate in pro-environment behaviors, the enterprise's green environmental protection organizational culture is built, and various conditions are created to provide opportunities for employees to participate. In this way, the enterprise's green human resource management framework is constructed (Hameed et al., 2022).

From the perspective of social design, scholars put forward the strategic model and implementation path of human resource management in enterprise ecological and environmental protection, and believe that human resource management should play a core role in enterprise ecological and environmental protection (Hameed et al., 2022). This model includes at least four parts: First, environmental management is carried out in a specific business environment. Second, environmental management is embedded in the organization's human resource management. Thirdly,

it highlights the important position of the human resource management system in realizing the change of organizational environmental management (Karmoker et al., 2021). Fourth, it explains the horizontal and vertical coordination of human resource management practices, and realize the efficient collaboration between human resource management and practice under the ecological and environmental protection strategy of enterprises. In the measurement of green human resource management, scholars have a high degree of recognition for employees' green recruitment, green training, green salary, and green performance (Ahmad et al., 2021). The green human resource management measurement focuses on these four areas. In green recruitment, environmental awareness and carbon footprint reduction are proposed in the process of employee recruitment and selection. Green training focuses on employees' environmental motivation and ability. Green pay is an employee's environmental improvement advice and environmental skills.

Green human resource management system still needs to take into account the basic functions of traditional human resource management. Therefore, the establishment of a green human resource management system can also be divided according to the functions of traditional human resource management. Extant literature has provided four categories of GHRM practices which include; (1) green hiring or recruitment, (2) green training and development, (3) green participation and involvement, and (4) green appraisal and performance management (Mitta & Kaur, 2022; Mansoor et al., 2021; Ribeiro et al., 2022).

(1) Green Hiring and Recruitment

Green hiring and recruitment refer to engaging persons with prior knowledge and skills about the environment and a person who behaves in an environmentally friendly manner ((Nisar et al., 2021). Thus, during the recruitment of employees in a firm, managers most likely select green-conscious candidates and those who engage in low carbon behavior (LCB) (Mitta & Kaur, 2022; Mansoor et al., 2021; Ribeiro et al., 2022).

(2) Green Training and Development

Green training and development also involve training workers to comprehend new environmental policies and practices (Hameed et al., 2022). Moreover, it involves articulating and creating environmental concerns among employees and stimulating them to learn environmental protection techniques (Karmoker et al., 2021). Green training influences workforce behavior by increasing their environmental awareness, which ultimately discourages them from engaging in

behavior that can cause damage to the ecological system (Saeed et al., 2019).

(3) Green Participation and Involvement

Green participation and involvement can be described as workforce engagement in green initiatives that promote their ecological behavior and empower them to initiate new ideas for protecting the environment. Pham et al. (2020) argued that firms that focus on staff involvement and participation in green initiatives generate opportunities for their employees to apply their skills, abilities, and knowledge in activities that promote environmental protection.

(4) Green Appraisal and Performance Management

Employees' green training and developmental needs are assessed through a green appraisal system to boost the morale and confidence of staff who engaged in green innovation practices (GIP) at the workplace (Ahmad et al., 2021). Green appraisal denotes the system of assessing staff outcomes in light of environmental management strategies such as dissipating carbon emissions, reducing waste of resources, carrying out ecological duties, and communicating environmental concerns to superiors (Karmoker et al, 2021). Green performance management affects the employees' level of commitment toward achieving environmental goals. Moreover, appraising employees through green rewards can stimulate and motivate staff to behave in an environmentally responsible manner (Lin et al., 2020).

Related research on green human resource management focuses on organizational citizenship behavior (OCB), green innovation practices (GIP), green organizational commitment (GOC), and environmental performance (EP). The studies summarized in Table 2.1 offer robust empirical and theoretical support that significantly inform the conceptual framework of this research. They collectively demonstrate that green human resource management (GHRM) is a standalone practice and a critical antecedent to green innovation, organizational citizenship behavior (OCB), and corporate environmental performance (CEP). Research grounded in the AMO theory consistently show that enhancing employees' abilities, motivation, and opportunities through GHRM could stimulate green innovation and proactive citizenship behaviors, driving improvements in CEP. Similarly, studies employing the Resource-Based View (RBV) underscore that internal resources are fundamental to fostering sustainability. These findings justify the direct and indirect pathways in the proposed structural equation model, where GHRM influences CEP through green innovation practices and OCB, as shown in Table 2.1.

Table 2.1 Summary of Studies on Green Human Resource Management

Author and Year	Applied Theory	Independent Variable	Mediator/ Moderator	Dependent Variable
(Mansoor et al., 2021)	Componential Theory	GHRM, Green Initiatives	GTFL	Green Creativity
(Aboramadan, 2020)	AMO	GHRM	Green Climate	OCB
(Ercantan & Eyupoglu, 2022)	AMO	GHRM	Psychological Green Climate	OCB
(Ansari et al., 2022)	AMO	GHRM	GIP	CEP
(Hameed et al.,2021)	AMO	GHRM	GTFL, OCB	Green Creativity
(Iqbal et al., 2021)	AMO	GHRM	GOC	CEP
(Sun et al., 2022)	RBV, AMO	GTFL	GHRM, GIP	GIP
(Farooq et al., 2021)	SCT	GHRM	GTFL, Green Self-efficacy	CEP
(Irani et al., 2022)	AMO, SET	GHRM	Work Engagement, Job Satisfaction	Green Creativity
(Fawehinmi et al., 2020)	AMO	GHRM	Personal Norms	OCB
(Al-Ghazali & Afsar, 2020)	AMO	GHRM Green Values	OCB intention	OCB
(Mateen et al., 2022)	SCT	GHRM Environmental Strategy	Green Climate, Environmental, Consciousness	Green Creativity
(Hameed et al., 2022）	AMO	GHRM	Green Human Capital.	OCB

Note: OCB: organizational citizenship behavior; GIP: green innovation Practices; GOC: Green Organizational Commitment; GHG: Greenhouse Gas; CEP: corporate environmental performance; GHRM: Green Human Resource Management; AMO: Ability, Motivation, and Opportunity; SCT: Social Cognitive theory; RBV: Resource-Based View; GTFL: Green Transformational Leadership

Author and Year	Applied Theory	Independent Variable	Mediator/ Moderator	Dependent Variable
(Sabokro et al., 2021)	-	GHRM	Psychological Climate, Corporate, Environmental, Responsibility	GOC
(Irani et al., 2022）	-	GHRM	GIP	OCB
(Ababneh, 2021)	AMO	GHRM	Employee Engagement Personality Traits	CEP
(Haldorai et al., 2022)	RBV	GOC Green Intellectual Capital	GHRM	CEP
(Zhu et al., 2021)	-	GHRM	ENK Green Values	LCB
(Mansoor, Jahan, et al., 2021)	RBV	Green Human Capital Green Relational Capital	GHRM	CEP

Note: OCB: organizational citizenship behavior; GIP: green innovation Practices; GOC: Green Organizational Commitment; GHG: Greenhouse Gas; CEP: corporate environmental performance; GHRM: Green Human Resource Management; AMO: Ability, Motivation, and Opportunity; SCT: Social Cognitive theory; RBV: Resource-Based View; GTFL: Green Transformational Leadership

Source: Researcher, 2025

2.4 Green Innovation

2.4.1 Definition of Green Innovation

Schumpeter (1934) first discussed the role of technological innovation in the process of economic development from the perspective of economics. Enterprise innovation was multifaceted and takes place in various forms in different fields of enterprise operation, giving birth to strategic innovation, management innovation, and product innovation. Based on Schumpeter's innovation theory, green innovation pays more attention to resource allocation and organizational innovation. Fussler and James (1996) put forward the concept of ecological innovation in their book Promoting Ecological Innovation: New products and processes that enhance the value of customers and enterprises can greatly reduce the negative impact on the environment. Driessen and Hillebrand (2014) argued that green innovation need not be developed to reduce environmental burden, but it does produce environmental benefits. The organization for economic cooperation and development defines it as the creation or implementation of new or significantly improved products, processes, marketing methods, organizational structures, and institutional arrangements that, whether intentional or not, improve the environment compared to relevant alternatives (Tariq et al., 2017). The representative definitions of green innovation by existing scholars are shown in Table 2.2.

Table 2.2 Summary of Studies on Green Innovation Definition

Author and Year	Definition
Fussler & James (1996)	New products and processes that enhance customer and corporate values while minimizing environmental impacts.
(Driessen & Hillebrand, 2014)	green innovation does not necessarily aim to reduce environmental burdens, yet it yields significant environmental benefits.
(Chen et al., 2006)	Hardware or software innovations related to green products or processes encompass technological innovations such as energy conservation, pollution prevention, waste recycling, green product design, or corporate environmental management.
Carrillo-Hermosilla et al. (2010)	Innovations that reduce the environmental impact of consumption and production activities.
(Albort-Morant et al., 2018)	An innovation primarily aimed at mitigating or avoiding environmental harm, and conserving the environment, while enabling enterprises to cater to new consumer demands, create value, and increase revenue.
(Wang & Juo, 2021)	Innovations leveraging improved technologies, systems, and management

Author and Year	Definition
	practices to mitigate the negative environmental impacts of operations.
(Singh et al., 2021)	green innovation refers to improving products or processes using environmentally friendly technologies in production processes that hurt the environment.

Source: Researcher, 2025

Early studies have identified environmental stewardship and green innovation as wasteful and unnecessary investments that hinder a company's ability to grow and become profitable. Stakeholder Theory indicates that maintaining trust-based cooperation with a wide range of stakeholders plays an important role in corporate strategy and environmental management decisions (Freeman, 1984). Stakeholder groups, especially regulators, customers, and environmental organizations, exert environmental pressure on enterprises to promote environmental practices and green innovation (Kawai et al., 2018). Porter's hypothesis further proposes that industrial pollution was caused by inefficient use of resources (Porter & Van der, 1995). When enterprises face challenges such as resource shortage, environmental pollution, and ecological deterioration, environmentally friendly R&D can help enterprises reduce costs and production costs (Porter & Van der, 1995). Ecological modernization theory combines modern market logic and innovative competition with the market potential of global environmental needs, revealing the possibility of overcoming the environmental crisis without leaving the path of modernization (Janicke, 2008; Pataki, 2009). Green management is an innovative mechanism for enterprises to incorporate environmental issues into their operations, which can affect the competitiveness and profitability of enterprises (Janicke, 2008). With the increasing environmental pressure, most studies support the view that enterprises need to take the initiative to adopt environmental management and rely on green innovation to enhance their competitiveness. green innovation had been regarded as one of the important strategic tools for enterprises to achieve sustainable development and plays a crucial role in environmental protection and the long-term survival and development of enterprises.

From the perspective of innovation content, green innovation refers to hardware or software innovation related to green products or processes, involving technological innovation such as energy saving, anti-pollution, waste recycling, green product design, or environmental management (Chen et al., 2006). Green innovation is often related to reducing product, process, or organizational changes that may create environmental burdens during business operations, to design products that consume

less energy, require fewer raw materials to manufacture, have less adverse impact on the environment when used, and are easy to recycle after use (Roper & Tapinos, 2016; Khanra et al., 2021). According to the perspective of innovation boundary, Cheng et al. (2014) defined the external boundary of green innovation as all the external activities in which enterprises interact with regulators, suppliers, customers, and other external stakeholders in terms of green and sustainable activities. Internal boundaries are related to green innovation management processes such as organization management, production process, and new product development.

From the perspective of innovation process, green innovation is essentially a process of new knowledge innovation, which needs to rely on high-level knowledge management and realize the availability of knowledge and continuous supply of new knowledge through internal resource arrangement, external knowledge integration, and comprehensive application of internal and external knowledge, to help enterprises solve environmental problems in innovative ways and generate value (Kiefer et al., 2018; Guo et al., 2020).

From the perspective of innovation outcomes, green innovation goes beyond regulatory compliance and was a series of innovations aimed at environmental sustainability (Huang & Li, 2015). Firms use improved technologies, systems, and management practices to mitigate or restore the impacts of polluting producers or resource users, or to reduce resource use in the face of expected negative impacts (Wang & Juo, 2021; Huang & Chen, 2022). Effectively solving ecological problems can be used as a means to enhance competitive advantage. Therefore, enterprises can adopt active green innovation strategies by producing novel or improved products and processes to reduce the negative impact on the environment and meet the green market demand to help enterprises seek competitive advantage from low cost and differentiation and ultimately realize the coordinated development of environment, economy, and society (Jänicke, 2008; Chang, 2011; Kiefer et al., 2018; Wang et al., 2020).

Green innovation has dual externalizations of innovation and environmental protection, namely, the innovation spillover effect in the R&D and innovation stage, and the environmental spillover effect in the adoption and diffusion stage (Guo et al., 2020; Khanra et al., 2021). Green innovation is more complex and more demanding than ordinary innovation, which requires enterprises to integrate internal and external resources and strengthen the level and ability of green innovation (Guo et al., 2020; Cui & Wang, 2021). Combined with Chen et al. (2006) and (Albort-Morant et al. (2018), this study defines green innovation as an innovative activity whose main objective is to reduce or avoid environmental damage, while enabling enterprises to meet new

consumer demands, create value and increase revenue, involve technological innovations such as energy conservation, pollution prevention, waste recycling, green product design or corporate environmental management. Green innovation contains two meanings: first, environmental benefits. The environmental spillover effect of green innovation can reduce or avoid environmental pollution, reduce environmental risks, and improve resource utilization efficiency and flexibility through terminal treatment and the use of clean technologies. Second, in addition to reducing enterprise costs, the innovation spillover effect of green innovation can also improve the level of value creation and meet the environmental protection needs of stakeholders by providing innovative products with green economic value.

2.4.2 Dimensions of Green Innovation

At present, scholars have divided the dimensions of green innovation based on different theoretical backgrounds and research perspectives. Among them, researchers generally agree that it is divided into the dimensions of green process innovation and green product innovation (Chen, 2007; El-Kassar & Singh, 2019; Awan et al., 2020; Rehman et al., 2021). In addition, Chiou et al. (2011) divided green innovation into green process innovation, green product innovation, and green management innovation from the perspective of innovation objects. Chen et al. (2014) divided green innovation into breakthrough green innovation and progressive green innovation according to the change and novelty of green innovation. From the perspective of duality theory, organizational duality emphasizes adaptability and flexibility to changes in the environment. green innovation was also divided into exploitative green innovation and exploratory green innovation (Sun & Sun, 2021), based on the dual balance between exploratory and exploratory activities. Chen et al. (2012) divided green innovation into active green innovation that takes positive innovative actions and reactive green innovation that complies with environmental regulations and ADAPTS to the needs of stakeholders according to the initiative of enterprise innovation. Hart's (1995) natural resource-based view indicates that enterprises can achieve coordination with the external natural environment by pursuing three distinct but interrelated environmental strategies: pollution reduction, product responsibility management, and sustainable development. This study believes that the dimension division of green product innovation and green process innovation can well echo the environmental strategy including pollution prevention, clean technology, and product management proposed by Hart's (1995) natural resource-based view, which is conducive to the improvement of products and processes of enterprises, to enhance the sustainable development ability of enterprises and help enterprises obtain sustainable competitive advantages. Khanra et al. (2021) divided green innovation into green process innovation

and green product innovation, as shown in Figure 2.1.

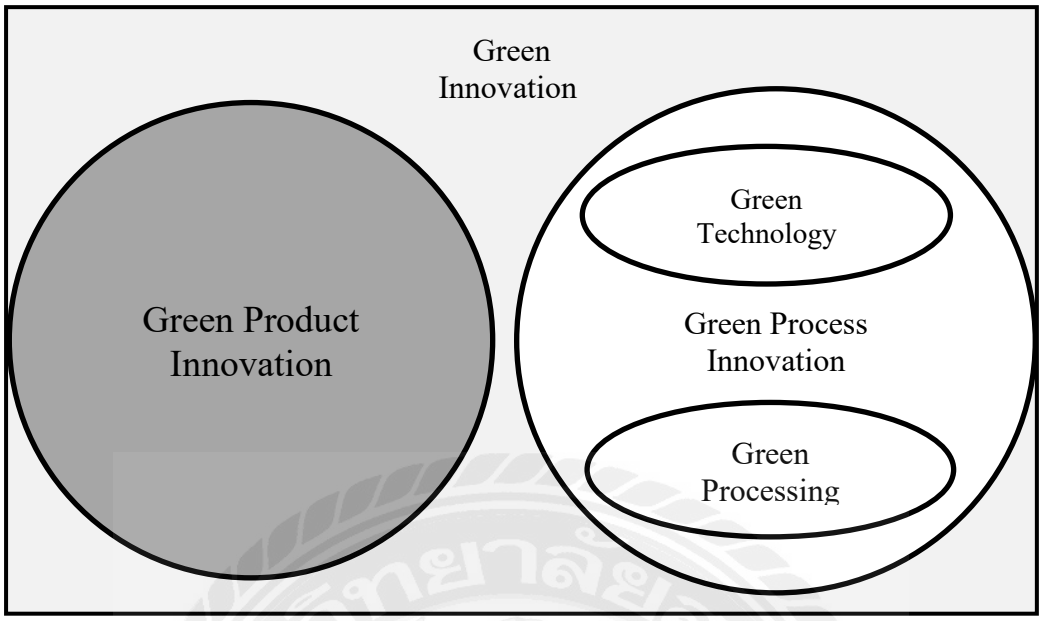

Figure 2.1 Connotations of Green Innovation

Source: Khanra et al., 2021

Green products are defined as products that use fewer resources, have lower environmental impacts and risks, and prevent waste generation at the stage (Dangelico, 2016). Green product innovation is to improve the design and function of products to minimize the negative impact on the environment during the whole life cycle of design, manufacturing, and sales, and to reflect the concept of environmental protection in the design and packaging of products. It not only helps enterprises to develop new market opportunities, increase market share, pursue high-end pricing, and create differentiation, but also it helps enterprises improve their reputation and gain legitimacy (Chang, 2011; Tariq et al., 2017; Albort-Morant et al.,2018; Huang & Chen, 2022). Among them, improving corporate reputation and product quality are important prerequisites for enterprises to develop green product innovation (Dangelico, 2016). Extended producer responsibility policies encourage companies to pay attention to the potential environmental impact of products throughout their life cycle and promote the development of green and innovative products that are easy to recycle and dispose of (Melander, 2017). A firm's ability to develop and adopt green innovation depends on its capacity to integrate process and product innovation with environmental objectives (Triguero et al., 2013). However, with the specialization of enterprises and the increasing complexity of products, it is often difficult for enterprises to meet all the knowledge and resources required for green innovation. Therefore, to improve the level of green product innovation, enterprises

not only need to cultivate technical capabilities and market capabilities. Internal integration and external integration should also be taken into account (Rennings et al., 2006). Companies need to focus more on collaboration with external stakeholders and inter-organizational learning to facilitate close communication and knowledge flow, thereby providing a solid foundation for green product innovation through high-level knowledge management (Wolf, 2011; Guo et al., 2020).

Green process innovation refers to the change or adjustment of the manufacturing process, which helps to reduce the negative impact on the environment in the production stage such as material procurement, manufacturing, or delivery, including green technology and green treatment (Rennings et al., 2006; Chien & Peng, 2012; Khan et al., 2019). Among them, green technology aims to reduce emissions in the production process through the efficient use of resources and energy, the use of environmentally friendly materials, and directly reduce harmful impacts on the environment, emphasizing continuous improvement and cost minimization (Xie et al., 2019). Green treatment is not an important part of the production process, but was customized to capture and treat emissions and pollution at the end of the production process, and was an additional measure taken solely to meet environmental requirements (Rennings et al., 2006; Chiou et al., 2011). Green process innovation often comes from within enterprises, and this type of innovation was more expensive to implement and more effective than other green practices (Xie et al., 2019). Green process innovation improving existing production processes or adding new processes can not only reduce the overall cost of the enterprise, and improve the efficiency of resource use and production efficiency, but also aim to reduce adverse environmental impacts to achieve ecological sustainability. However, due to the high degree of uncertainty and risk, more enterprises choose green treatment. Although green process innovation can bring new business opportunities for enterprises, it brought high research and development costs to enterprises. Therefore, compared with green technology, green treatment had more advantages.

A review of the development of green innovation measurement scales found that early classic scales provided a solid theoretical and empirical foundation for subsequent research. Although these scales possess high explanatory power in theory, their applicability and currency are limited when faced with the continuously evolving practices of green innovation. The scales proposed by Fatoki (2021) and Makhloufi et al. (2022) were further developed by inheriting the advantages of classic scales and by integrating, optimizing, and refining the content of existing scales. While maintaining the coverage of green innovation dimensions (such as green product innovation and green process innovation) of the original scales, they redesigned the scale items to address the new demands and

changes in current enterprises regarding environmental protection technologies, product design, packaging, and production processes, thereby making the measurement indicators more aligned with the actual practices of green innovation in modern enterprises. The scales of Fatoki (2021) and Makhloufi et al. (2022) not only inherit the advantages of traditional scales in covering the dimensions of green innovation but also update and expand the content based on the latest research and practical application contexts, rendering them more forward-looking. The new scale items, such as "The enterprise had strengthened environmentally friendly packaging across both new and existing product lines" and "The enterprise fully considers ecological factors during production and service processes," accurately reflect the core elements of green product innovation and process innovation. These scales have undergone rigorous empirical testing, and were applied to multiple industries and regions, enhancing the comparability and universality of research findings. Based on the validation in theory and empiricism, this study ultimately selected the green innovation measurement scales proposed by Fatoki (2021) and Makhloufi et al. (2022). These scales ensure continuity with classic theories while better reflecting the complexity and diversity of current green innovation practices, providing a solid and precise measurement tool for constructing the green innovation dimensions in this study.

2.4.3 Relevant Research on Green Innovation

Resource-Based View Theory is the dominant theory of green innovation research (Oduro et al., 2021). The research on influencing factors of green innovation includes policy factors, market factors, technology factors, social network factors, stakeholders, and so on. The effects of green innovation include economic performance, social performance, environmental performance, organizational performance, and so on. The findings summarized in Table 2.3 have significant implications for the conceptual framework, which examines the relationships among green human resource management, green innovation, organizational citizenship behavior, and corporate environmental performance. The findings illustrate that different dimensions of green innovation yield outcomes, including positive effects (e.g., enhanced economic performance, improved corporate image, and better environmental performance) and negative effects (e.g., increased energy consumption and higher short-term business costs). These insights have informed the structural equation model by highlighting green innovation's multifaceted role as both an outcome and a mediating factor that links GHRM practices to corporate environmental performance. Thus, the comprehensive evidence provided by Table 2.3 reinforces the rationale for integrating these variables into the model, ensuring that the research framework accurately reflects the complexity and dynamic nature of green innovation in practice.

Table 2.3 Summary of Studies on Consequences of Green Innovation

Green Innovation		Consequences	Authors
Green Product Innovation		Corporate Economic Performance (+)	Dangelico, 2016; Triguero et al., 2013
		Corporate Image (+)	Chang, 2011; Albort-Morant et al.,2018; Huang & Chen, 2022
		Energy Consumption (-)	Dangelico, 2016
		Environmental Performance (+)	Melander , 2017
		Green Creativity (+)	Triguero et al., 2013
		Green Product Performance (+)	Rennings et al., 2006; Triguero et al., 2013
		Competitive Advantage (+)	Albort-Morant et al.,2018
Green Process Innovation	Green Technology	Environmental Protection (+)	Rennings et al.,2006; Chien & Peng，2012; Khan et al., 2019
		Short-term Business Costs, Product Quality Costs, Safety Costs (-)	Xie et al., 2019; Wolf, 2011
		Environmental Performance (+)	Rennings et al., 2006; Chiou et al., 2011
		Corporate Reputation (+)	Xie et al., 2019; Kim et al., 2019
		Eco-product Value (+)	Triguero et al., 2013; Oduro et al., 2022
		Eco-product Premium (+)	Khan et al., 2022; Tariq et al., 2017
		Environmental Ethics (+)	Gunasekaran & Spalanzani, 2012
		Environmental Responsibility (+)	(Latif et al., 2022;
		Brand Equity (+)	Rennings et al., 2006; Rennings et al., 2006
	Green Processing	Long-term Business Performance (+)	Goh et al., 2020
		Negative Environmental Impact (-)	Melander, 2017
		Environmental Performance (+)	Fawehinmi et al., 2020; Goh et al., 2020
		Competitive Advantage (+)	Kim et al., 2019
		Pioneering Advantage (-)	Faul et al., 2009; Rennings et al., 2006

Note: (+) Indicates A Positive Impact;(-) Indicates A Negative Impact.

Source: Researcher, 2025

At present, scholars have not reached a consensus on the impact of green innovation on economic performance. On the one hand, green innovation can promote economic performance. From a direct benefit perspective, green innovation encourages enterprises to use raw materials efficiently, re-integrate waste into the supply chain through closed cycles, and reduce raw material losses and waste disposal costs (Wang & Juo, 2021). Green product innovation can provide customer value and business value, thus directly improving the economic performance of enterprises. From the perspective of indirect benefits, green innovation can demonstrate the corporate image of an enterprise that actively takes environmental protection measures, and express the corporate environmental ethics that an enterprise strives to respond to the environmental protection needs of stakeholders, thereby indirectly improving the economic performance of an enterprise (Tarig et al., 2017; Khan et al., 2021). On the other hand, some studies suggest that green innovation fails to improve economic performance. Environmental management and green innovation may increase enterprise training costs, product quality costs, and safety costs in the short term.

Green innovation is related to the environmental management agenda of enterprises, which can reduce the negative impact of production and business activities on the environment through green treatment and technological innovation, and enhance product value through green product innovation, to respond to institutional pressure and environmental demands of stakeholders. Thus, the environmental performance of enterprises can be significantly improved (Singh et al., 2020). Green innovation can improve the efficiency of energy use control pollution, and help reduce the total energy demand, thus supporting the protection of natural resources and the restoration of ecological balance (Taig et al., 2017; Khan et al., 2021). Therefore, green innovation can also improve environmental performance at the macro level. green innovation helps to further stimulate the green creativity of employees. Enterprises' support for green innovation significantly improves labor productivity and work quality, and was conducive to improving employee performance (Taig et al., 2017). The unique creative development team can not only promote patent development, but also effectively respond to consumer needs and improve product quality, to obtain high green product development performance, thereby improving the overall image or reputation of the company, and improving customer loyalty (Chen & Chang,2013; Dangelico et al., 2016; Tariq et al., 2017).

Green innovation plays a key role in creating an enterprise's competitive advantage (Huang & Li, 2017). The green production process formed by enterprise green innovation can reduce resource waste and improve production efficiency to achieve cost leadership (Porter & Linde, 1995). Green innovation can also generate unique resources and capabilities that help enterprises create advanced

process technologies and thus gain first-mover advantages (Huang & Chen, 2022). Green product innovation embodies green concepts in product design and packaging, which can increase the value of ecological products, easily obtain the premium of environmentally friendly products from consumers, and help enterprises to develop new markets and form product differentiation advantages (Bhata & Jakhar, 2021). As an important environmental management tool, green innovation can help enterprises respond to the environmental protection needs of consumers, partners, governments, and other stakeholders, convey to the market a positive image of taking the initiative to assume environmental responsibility and environmental ethics, help improve the green reputation of enterprises, increase brand equity, and thus gain competitive advantages (Albort-Morant et al., 2018; Wang & Juo, 2021).

This study incorporates the concept of green innovation into the research, as several studies have shown that green innovation helps telecommunications enterprises to develop the green behavior of employees. Green innovation is a direct factor of enterprise environmental performance. Green innovation greatly improves the environmental performance of enterprises. To realize the effectiveness of green human resource management, green innovation must play a key role. Green innovation is an important component of the green strategy of telecom enterprises. Telecom companies need to adopt proactive measures and strategies to address current environmental challenges. Therefore, efforts to develop eco-friendly products and achieve technological advancement through green innovation can help companies win market share and gain competitive advantages.

2.5 Organizational Citizenship Behaviour

2.5.1 Definition of Organizational Citizenship Behavior

Barnard (1938) introduced the term "willingness to cooperate", which indicates that synergies between members of an organization have an effective effect on the organization and can actively contribute to the overall development of the organization. Katz (1964) elaborated on several types of employee behaviors in effective organization operation: (1) Do not leave the organization and actively participate in the organization; (2) Fulfill the behavior required by the standard position role in the organization; (3) The act of voluntarily achieving spontaneous activities. This kind of spontaneous activity mainly includes the conduct of cooperation, the protection of the organization, and the improvement of the external image of the organization.

Katz and Kahn (1966) further distinguished between in-role and out-of-role behaviors based

on Katz's (1964) earlier study. The second type of behavior referred to actions that fulfilled formal job role requirements, while the third type encompassed spontaneous behaviors that went beyond prescribed duties. They explained that many stereotyped behaviors within organizations exceed formal role descriptions. Building on Katz and Kahn's (1966) research, Bateman and Organ (1983) later defined this third type of spontaneous, extra-role behavior as *citizenship behavior*—actions that are not formally required but are beneficial and often expected within organizations.

Smith et al. (1983) and Organ (1988) provided an operational definition of organizational citizenship behavior (OCB), emphasizing that OCB encompasses: (1) extra-role behaviors that reflect employees' autonomy; (2) actions that are not directly or formally recognized or rewarded by the organization's official incentive system; and (3) behaviors that generate synergies and enhance organizational efficiency. They further clarified the following characteristics of OCB: (1) OCB represents extra-role behavior that is not explicitly stated in job descriptions; (2) OCB reflects employees' voluntary and self-initiated actions, rather than behavior mandated by the organization; and (3) OCB contributes positively to organizational development and overall effectiveness.

Existing studies have further introduced the classical concept of organizational citizenship behavior, arguing that organizational citizenship behavior was different from in-role behavior and was not the main assessment basis for performance rewards within organizations. The classical definition of organizational citizenship behavior were challenged by relevant studies, and relevant scholars have redefined organizational citizenship behavior, believing that organizational citizenship behavior contains the following three main characteristics: (1) voluntary extra-role behavior of employees in an organization; (2) behaviors that have a good impact on the development of the organization and benefit the organization; (3) positive behaviors that can enhance and promote the cultural atmosphere of the organization.

2.5.2 Dimensions of Organizational Citizenship Behavior

As for the research on the dimensions of organizational citizenship behavior, the academic community has not reached a consensus yet, and there are many different perspectives on the dimensions of organizational citizenship behavior. The research on the dimensions of organizational citizenship behavior is as follows: two-dimensional view, three-dimensional view, four-dimensional view, five-dimensional view, seven-dimensional view, and nine-dimensional view， as shown in Table 2.4.

Table 2.4 Summary of Studies on Organizational Citizenship Behaviour

Dimension	Author	Content
Two-dimensional Perspective	Smith (1983)	General Obedience, Altruistic Behaviour
Three-dimensional Perspective	Van Dyne (1994)	Organizational Obedience, Organizational Loyalty, Organizational Participation
Four-dimensional Perspective	Moorman (1995)	Employee Helpfulness, Employee Initiative, Diligence, Loyalty
Five-dimensional Perspective	Organ (1988)	Altruism, Responsibility, Sportsmanship, Virtue and Courtesy
Seven-dimensional Perspective	Farh (1997)	Company Identification, Helping Co-Workers, Initiative, Interpersonal Harmony, Protecting Company, Resources
Nine-dimensional Perspective	Podsakoff (2000)	Helping Behaviour, Sportsmanship, Loyalty, Obedience, Initiative, Virtue and Self Development

Source: Researcher, 2025

There are different connections between different dimensions of organizational citizenship behavior, and different dimensions contain the same dimension content. Recently, researchers have tended to use the integrated classification method to carry out dimensional research on organizational citizenship behavior. The integrated research on the dimensions of organizational citizenship behavior mainly integrates organizational citizenship behavior into two dimensions according to different classification criteria. The classical integrated research on the two dimensions of organizational citizenship behavior is shown in Table 2.5.

Table 2.5 Integration of Research on the Dimensions of Organizational Citizenship Behavior

Author	Standard	Integration of Dimensions
Williams (1991)	Five Dimensions Study	Caring for the Organization, Helping Colleagues with Out-of-Role Behavior
McNeely (1994)	Behavioral Beneficiaries	Helping Individual Behavior, Helping Organizational Behavior
Van Scotter (1996)	Comparison with Neighborhood Performance	Interpersonal Facilitation, Work Contribution

Author	Standard	Integration of Dimensions
Van Dyne (1998)	Meta-analysis	Advising Behavior, Helping Behavior
Bacharach (2007)	Comparison of Cultural Climate	Helping Behavior, Civic Ethics

Source: Researcher, 2025

McNeely (1994) divided organizational citizenship behavior into helping individuals and helping organizations according to the beneficiaries of behavior. Helping individuals was mainly to help colleagues, and helping organizations was to improve work and put forward reasonable suggestions to organizations. Van Scotter (1996) divided organizational citizenship behavior into interpersonal promotion and job contribution according to the comparative study between organizational citizenship behavior and peripheral performance. Van Dyne (1998) used the meta-analysis method to concretize the existing research on organizational citizenship behavior and divided organizational citizenship behavior into voice behavior and helping behavior. Bachrach (2007) divided organizational citizenship behavior into the helpfulness dimension and civic morality dimension. (1) The helpfulness dimension refers to a kind of altruistic behavior outside the role of an employee, which can help colleagues solve the problems encountered at work; (2) The dimension of civic ethics refers to the behavior of employees who have a sense of responsibility and complete various activities in the organization responsibly. Scholars of Organ (1988) perfected and revised the connotation of organizational citizenship behavior, which was widely accepted by current scholars. Although scholars have different definitions of organizational citizenship behavior due to different research perspectives, they follow the definition of Organ. Boiral and Paillé (2011), based on the definition of organizational citizenship behavior by Organ (1988) and combined with green environmental behavior, proposed that environmental organizational citizenship behavior was the behavior in which employees consciously show their love for the environment and promote the sustainable development of the organization in the workplace, beyond the requirements of the organization's rules and regulations. organizational citizenship behavior was representative in the study of employee environmental performance.

Tables 2.4 and 2.5 provide a review of the various conceptualizations and integrated classifications of organizational citizenship behavior (OCB), ranging from two-dimensional to nine-dimensional perspectives. These findings illustrate the complexity and diversity of OCB dimensions but also reveal common underlying themes, such as helping behavior and civic ethics, that emerge

across different studies. This multifaceted view underscores the challenge of reaching a consensus on OCB's structure while highlighting the trend toward integrating these dimensions into a more unified framework. The integrated perspective on OCB helps capture essential employee behaviors that extend beyond formal role requirements, making it a critical mediating variable in the structural equation model. By aligning our measurement approach with widely accepted OCB scales, we enhance theoretical coherence and empirical robustness, ultimately ensuring a more accurate assessment of how green human resource management and green innovation drive corporate green outcomes.

2.5.3 Research on Organizational Citizenship Behavior

(1) Antecedent variable

At the organizational level, human resource management practices, organizational climate, and policies can affect employees' organizational citizenship behavior. In terms of human resource management practices, Pai1leet al. (2014) proposed that strategic human resource management practices of organizations can promote organizational citizenship behaviors of employees. Zhao et al. (2019) found that social responsibility-oriented human resource management helps employees carry out organizational citizenship behavior. Luu (2019) proposed that green human resource management practices of enterprises can positively affect employees' organizational citizenship behaviors. Daily et al. (2012), from the perspective of training and authorization, proposed that supervisors and employees can cooperate to complete environmental protection work, promote employees' active participation in corporate environmental management, and stimulate their environmental citizenship behavior. Pham et al. (2018) proposed that when enterprises provide environmental protection training to employees, employees were more likely to carry out environmental organization citizenship behavior. In terms of organizational environment, Zientara and Zamojska (2016) showed that an organizational green atmosphere can positively affect employees' environmental organizational citizenship behavior. In terms of policy, Raineri and Paillé (2016) proposed that environmental policies implemented within organizations can promote employees to implement environmental organizational citizenship behaviors, and environmental commitment plays an intermediary role in this.

(2) Result variable

Empirical research on the impact of organizational citizenship behavior on outcomes has

mainly emphasized its positive effects, but recent studies have started to pay greater attention to its possible negative consequences. In terms of positive effects: (1) Employees can benefit from OCB, which can improve leaders' evaluation of employee performance and increase employee rewards; Improve employee satisfaction. (2) Organizations can benefit from organizational citizenship behavior, improve the green innovation behavior of enterprises, and improve the environmental performance of enterprises. Environmental organizations' civic behavior can affect their environmental performance and operational cost output. Ramus and Killmer (2007) proposed that employees' environmental citizenship behavior can promote organizations to improve environmental performance. Chen et al. (2015) found that employees' environmental citizenship behavior can help organizations reduce energy consumption and production costs.

The negative effect of organizational citizenship behavior is manifested in the increase of individual costs and organizational costs. The individual costs of organizational citizenship include (1) role stress, overload, and conflict; (2) working pressure; (3) work-family conflict; (4) loss of organizational rewards; (5) hindered career growth. These negative effects ultimately led to the reduction of personal work efficiency and the reduction of green environmental performance. If employees engage in OCB primarily to enhance their image, a high level of OCB may impose excessive burdens on them. For example, the continuous improvement of the company's green performance standards might have caused greater pressure on employees. Employees need to engage in higher levels of organizational citizenship to be seen as cooperative and committed employees. Long-term investment of time in organizational citizenship behavior may have adverse effects on employees' access to organizational rewards and opportunities for career advancement. As a result, high standards of environmental performance put pressure on employees' organizational citizenship behavior, reducing employee efficiency and environmental organizational citizenship behavior. Employees may need to spend additional hours, including working overtime, to achieve environmental performance targets, which can increase work–family tension.

The organizational cost of organizational citizenship behavior concerns whether OCB is always beneficial to the organization, as some forms of OCB may have adverse effects on both the group and the organization, including inefficiency and heightened stress. Existing studies have found that the motives underlying OCB can include self-interest, which may harm organizational functioning as well as employees themselves. When employees devote excessive effort to extra-role behaviors, their involvement in core work tasks can decrease, leading to lower individual performance, which is ultimately detrimental to overall organizational performance. The high

frequency of organizational citizenship behavior hinder employees' work progress and is not conducive to the improvement of organizational performance.

Therefore, this study took the organizational citizenship behavior of telecommunications enterprises as an important factor in the research model. Organizational citizenship behavior reflects the sense of responsibility and social sense of employees. Organizational citizenship behavior of employees in telecommunications enterprises helps reduce the cost of enterprises and improved the operation efficiency of enterprises.

2.6 Corporate Environmental Performance

2.6.1 Definition of Enterprise Environmental Performance

At first, the study of environmental performance evaluation was mainly included in the evaluation of corporate social responsibility, but with the increasing attention to environmental issues, environmental performance evaluation had gradually become independent and become an important research topic (Zobel et al., 2002). Especially since the 1990s, the research on enterprise environmental performance evaluation indicators and standards have gradually increased. At present, given how to evaluate the performance of enterprises in terms of environmental input and output, important international accounting institutions, environmental protection organizations, and government agencies have put forward a series of guidelines or guidelines on environmental performance evaluation indicators for the reference and use of enterprises in various countries.

For example, in 1994, Conference on Interaction and Confidence Building Measures in Asia (CICA)'s Environmental Performance Report, which was developed mainly to meet the environmental information needs of external stakeholders of enterprises, included the protection of wild animals and plants, the destruction and restoration of land, and the resources extracted, used and regenerated into environmental performance indicators (He & Loftus, 2014; Li et al., 2016). In 1999, the ISO14031 environmental performance evaluation standard issued by the International Organization for Standardization (ISO) divided the environmental performance evaluation indicators into two categories: external environmental status indicators (ECI) and internal environmental performance indicators (EPI), and further divided EPI into operational performance indicators (OPIs) and management performance indicators (MPIs). Take into account the impact of organizational operations and management actions on the environment.

In 2000, the World Commission on Sustainable Development (WBCSD) issued "Measuring

Eco-Efficiency: Guidance for Reporting Corporate Performance", which was an important tool for enterprises to communicate with other internal or external stakeholders. It first proposed a set of eco-efficiency evaluation criteria to guide enterprises in environmental performance evaluation. It can directly reflect the relationship between enterprise environmental performance and economic performance (Trumpp et al., 2013). In addition, the WBCSD sets three broad categories of indicators for the measurement of ecological benefits, namely, the value of a product or service, the impact on the environment during the creation of the product or service, and the impact on the environment during the use of the product or service. Although this set of indicators helps managers to set goals and make continuous improvements, no research had been conducted on the specific methodology needed to integrate environmental performance indicators and financial performance indicators, nor had quantification of the core indicators been explored. In 2006, the Global Reporting Initiative (GRI) issued the "Sustainability Reporting Guide" which pointed out that the sustainable development of enterprises includes three aspects: environmental, social, and economic, and the recommended environmental performance indicators (such as total energy used, total electricity, total fuel, etc.) apply to all enterprises providing sustainability reports (Trumpp et al., 2013).

Corporate environmental performance refers to the performance of enterprises in environmental protection and resource management. It measures the environmental impact of enterprises in the process of production and operation, as well as the measures taken to reduce the negative environmental impact and the results achieved. Environmental performance evaluation is an important part of corporate social responsibility (CSR) and sustainable development strategy, which aims to reduce environmental burden and enhance corporate image and market competitiveness.

2.6.2 Measurement of Enterprise Environmental Performance

Corporate environmental performance has become an international and hot issue, and scholars at home and abroad are committed to the measurement and evaluation system of corporate environmental performance. Some scholars selected indicators based on product life cycle (Zobel et al., 2002), ISO14031 standard (Trumpp et al., 2013), and toxic substance emission inventory TRI (Cho & Roberts, 2010). With the deepening of research, the financial performance of enterprises has also become a dimension that cannot be ignored in the evaluation of environmental performance. The requirements of sustainable development theory for enterprises include two aspects, namely economic sustainability and environmental sustainability, which further requires that when determining the value of corporate sustainability, we should start from the value created by economic capital, environmental capital, and social capital invested by enterprises (Meng et al., 2014), and

pursue the win-win interests between enterprises and various symbionts and symbiotic units (He & Loftus, 2014; Li et al., 2016), Explore new environmental performance systems.

Porter and Linde (1995) believed that the innovation brought by the improvement of environmental performance can partially offset its cost, and environmental protection behavior can also bring intangible benefits to enterprises. By improving energy use and reducing waste generation and emissions more efficiently, enterprises can significantly reduce operating costs, thereby improving corporate performance and enhancing market competitiveness. Russo and Fouts (1997) believed that the implementation of forward-looking environmental strategies leads to the improvement of corporate performance, and the positive response to environmental problems can enable enterprises to obtain corresponding financial returns because the positive response and strategic management of the environment can reduce the capital cost of enterprises and thus reduce expenses. Woolman and Veshagh (2007) believed that environmental benefits and economic benefits can be effectively integrated, and only when they were closely linked can sustainable economic development be achieved. Kacperczyk and Hong (2006) demonstrated in the classic investment model that most investors would choose between "evil stocks" and "clean assets" enterprises with good environmental image. Therefore, enterprises with good environmental performance would be more conducive to raising more funds and creating more economic benefits.

Scholars have roughly divided the construction of enterprise environmental performance evaluation and index system into two categories: one is the evaluation system based on environmental data, and the other is the evaluation system including both environmental and financial data (Stanitsas & Kirytopoulos, 2021). The first category highlights the important position of environmental protection and resource conservation in the process of company operation but ignores the position of economic benefits in the sustainable development of enterprises. The second category comprehensively considers the financial performance indicators based on the first category. However, existing studies still lack research in the fields of the combination of qualitative environmental data, environmental scoring data, environmental-specific data, and financial data. In particular, there is still a lack of an index system that can reasonably reflect the possible dynamic balance of "trade-off" between environmental performance and financial performance. Therefore, most literature remains at the level of theoretical construction (Úbeda-García et al., 2021; Wang et al., 2021). On the one hand, specific data (especially at the company level) in the main sources of environmental data are scarce, and the environmental indicators in most databases are still at the level of 0-1 variables. Even so, these scarce environmental data are also conducive to further research by scholars. On the other

hand, due to the heavy task of manual data collection, scholars seldom use actual enterprise data (especially multi-year and multi-industry data) for evaluation (Wang et al., 2021).

The enterprise environmental performance evaluation index has very urgent theoretical and practical significance in the process of social and economic development (Wang et al., 2021). Theoretically, it can expand the knowledge in this field and deepen the understanding of the government, enterprises, and society on the enterprise's environmental performance. In practice, the environmental performance of enterprises can be more objectively reflected, and the horizontal comparison between different enterprises and industries can be realized, as well as the vertical comparison at different times, to promote the supervision of the government and the public's cognition, and also help the adjustment and improvement of enterprises themselves, to introduce enterprises to the track of harmonious development of economy and environment, and realize the symbiosis and win-win situation between enterprises and society (Stanitsas & Kirytopoulos, 2021). The enterprise Environmental Finance Index adopts a set of standardized and standard evaluation and calculation processes to ensure comparability among different enterprises, and it can reflect the environmental performance of enterprises. The method of data acquisition uses the content analysis method and the virtual variable setting method. The environmental index system constructed by scholars is mainly divided into two modules, namely, environmental input and environmental output (Ren et al., 2019). The former refers to monetary input (environmental protection input, environmental remediation costs, etc.) and resource input (energy, water resources, etc.) made for environmental protection in daily business activities; the latter refers to the environmental effects brought by the entire production process of an enterprise, including negative indicators, such as waste water discharge, waste discharge, etc., also contain positive indicators, such as the reduction of pollutants, resource recycling, etc. (Le & Manh, 2022). The specific indicators is based on the environmental management strategy and draw on international experience, such as the relevant indicators proposed by the Canadian Institute of Chartered Accountants (CICA), the World Council for Sustainable Development of Enterprises (WBCSD), the International Organization for Standardization (ISO) and the Ministry of Environment of Japan, in combination with China's economic and social development level, relevant laws and regulations and business characteristics. Finally, an environmental finance index system suitable for Chinese enterprises was designed (Ren et al., 2019).

Based on the above research, this study takes the environmental performance of telecommunications enterprises as the research object. Corporate environmental impact refers to the

actions taken by a company to meet society's requirements for protecting the natural environment, rather than just complying with laws and regulations. It deals with the environmental impact of corporate green innovation, including processes, products, and resource consumption that comply with laws and environmental regulations.

2.6.3 Research on Corporate Environmental Performance

Corporate environmental performance (CEP) evaluation plays a significant role in ensuring the efficiency and effectiveness of environmentally friendly initiatives (Stanitsas & Kirytopoulos, 2021). CEP focuses on the outcome of a firm's environmental initiatives and the consumption of resources in enterprise environmental impact and operations of activities assesses it. Thus, the CEP dimension indicates the strategic approach firms adopt that aligns with management actions and principles that preserve the environment (Ren et al., 2019). CEP can be assessed quantitatively by integrating environmental concerns into a business model. Moreover, business managers can create a plausible environmental corporate image by embedding pollution problems and environmental conservation into their business operations (Le & Manh, 2022).

Similarly, Sraieb and Akin (202l) envisaged CEP due to manufacturers' operational processes on their ecological consequences. Different research used a variety of approaches to measure the CEP of firms. For instance, Nisar, Khan, et al. (2021) assessed the CEP of the hotel based on participants' perceptions about energy consumption, purchases of non-renewable material, reduction in cost, market position, and the company's reputation. In China, Tian & Lin (2019) proposed the evaluation of EP through ISO 14000. The ISO 14000 was a set of environmental management standards designed to help organizations minimize pollution and waste while complying with relevant laws, regulations, and other environmental requirements (TechTarget, 2022).

The proficient use of cleaner and sustainable energy sources significantly analyses CEP. Thus corporates need to ensure less emission during their business operation procedure and process (Masocha, 2018). As reported by Solovida & Latan (2017), for firms to improve their level of CEP, it requires the involvement of the following enterprise intangible resources (as suggested in the RBV theory): (1) employee awareness, (2) employee knowledge, (3) the utilization of management accounting procedures, (4) expertise and skills of employees, (5) commitment of managers, and (6) communication and coordination among strategic department of the firms. A summary of prior studies related to CEP had been provided in Table 2.6.

Moreover, the demand for corporates to improve on CEP comes from the pressure of stakeholders, media, investors, government, business financiers, and employees (Solovida &Latan, 2017). In addition, Mouro and Duarte (202l) believed that another significant factor affecting firm EP the behavioral concepts, including managers' and employees' beliefs and social values. The author argues that these behavioral factors were key determinants of the level of CEP of companies. In response to the ways mentioned above of assessing the CEP of firms, in this study, the researcher measured firm CEP according to employees 'understanding and knowledge about low-carbon behavioral activities, Ren et al. (2019) indicated that corporates' CEP could be enhanced through a process-oriented approach (low carbon behavior). Thus, CEP was assessed through the perceived performance based on employees' ideas and opinions of the efficiency and effectiveness of environmental behavior and practices adopted in corporates. More specifically, the items used to evaluate responses from the employees focused on environmental improvement strategies, greenhouse gas emissions, waste reduction, and level of recycling activities (Fernando et al., 2019, Kraus et al., 2020). The measurement of CEP from the micro or individual perspective has been applied in these prior studies as summarized in Table 2.6.

Table 2.6 Summary of Studies on Corporate Environmental Performance

Author and Year	Country	Sample Size	Independent Variable	Mediator / Moderator	Dependent
(Naz et al., 2021)	Malaysia	373	GHRM, Green Intellectual Capital	OCB	CEP
(Masocha.2018)	South Africa	208	Environmentally Sustainable development, GIP		CEP
(Riva et al.,2021)	Bangladesh	363	Green Knowledge, Leadership Style	Green Creativity	CEP
(Raza&Khan,2022)	Pakistan	381	GHRM	Green Values	CEP
(Nassani et al. 2022)	Saudi Arabia	319	Environmental Resource Conservation Efforts	Corporate Environmental Responsibility Authenticity	CEP
(Ahm Ullah. Arshad. et al.,2021)	Pakistan	436	Corporate Social Responsibility	OCB Gender	CEP
(Elshaer et al., 2021)	Egypt	560	GHRMM Task-related to OCB	OCB	CEP
(Haldorai et a1.,2022)	Philippine	800	Top Management GOC Green Intellectual Capital GHRM	GHRM	CEP
(Ubcda-Garcia et al.,2021)	Spain	120	GHRM, Green Intellectual Capital	Green Ambidexterity	CEP
(Latan et al.,2018)	Indonesia	128	Environmental Strategy Top Management GOC	Environmental Management	CEP
(Makhloufi et al., 2021)	China	234	Green Absorptive Capacity, Environmental Cooperation	GIP	CEP
(Channa et a1.,2021)	Pakistan	282	Corporate Environmental	Green Orientation	CEP

Author and Year	Country	Sample Size	Independent Variable	Mediator / Moderator	Dependent
			Responsibility		
(Meirun et a1.,2020)	China	226	Green Absorptive Capacity Environmental Concern Environmental Cooperation	OCB	CEP
(Yu et al.,2021)	China	281	Corporate Environmental Responsibility OCB	Green Creativity	CEP
(Kim et al., 2019)	USA	390	GOC	Green Values	CEP

Note: GIP: green innovation practices; GOC: green organizational commitment; CEP: corporate environmental performance; GHRM: green Human resource management; OCB: organizational citizenship behavior.

Source: Researcher, 2025

2.7 Related Impact Studies

2.7.1 The Impact of Green Human Resource Management on Corporate Environmental Performance

Green human resource management (GHRM), as a new concept integrating environmentally sustainable development and human resource management, has been widely concerned in recent years (Mansoor et al., 2021). Corporate environmental performance (CEP) is an important index to measure corporate environmental responsibility and sustainable development ability. GHRM emphasizes the integration of green concepts in recruitment, training, performance management, and other aspects, to enhance employees' environmental awareness and behavior, and thus have a positive impact on the overall environmental performance of enterprises (Elshaer et al., 2021). GHRM refers to integrating environmental management concepts into all aspects of enterprise human resource management, including recruitment, training, performance appraisal, compensation, and incentive, to promote employees' environmental awareness and environmental behaviour (Ansari et al., 2022). GHRM covers green recruitment, green training, green performance management, and green pay incentives, and aims to promote the joint commitment of enterprises and their employees to environmental protection and sustainable development. CEP is often used to measure a company's performance in environmental protection (Makhloufi et al., 2021). Based on a company's practices in pollution reduction, resource conservation, waste management, and carbon footprint, CEP can be evaluated from multiple dimensions (e.g. eco-efficiency, carbon emissions, waste disposal, etc.). Many studies have shown that an enterprise's CEP not only affects its competitiveness in the market but also enhances its social reputation and image (Sun et al., 2022).

It is generally believed that GHRM can significantly improve the environmental performance of enterprises. By emphasizing environmental responsibility and green ideas in green recruitment, companies can attract environmentally conscious candidates. Such employees are more inclined to support and participate in the environmental protection activities of the enterprise, thereby improving the environmental performance of the enterprise (Makhloufi et al., 2021). The implementation of systematic green training by enterprises can improve the environmental protection knowledge and skills of employees, make them pay more attention to energy saving, emission reduction, and environmental protection in their daily work, and thus improve the environmental performance of enterprises. By integrating environmental objectives into employees' performance appraisal systems, companies can encourage employees to pay attention to environmental protection in their work, and thus promote better environmental performance. By providing incentives related to environmental

performance, such as environmental protection bonuses and carbon reduction incentives, enterprises can motivate employees to actively participate in environmental protection activities and ultimately improve their environmental performance. By promoting environmental awareness and skills (Naz et al., 2021), GHRM enables employees to adopt more sustainable behaviors in their daily work. This kind of behavior change can greatly help improve the environmental performance of enterprises. The green culture of enterprises was crucial for the effective implementation of GHRM. Studies have shown that when enterprises have a strong environmental culture (Yu et al.,2021), GHRM can better promote employees to participate in environmental actions and improve the environmental performance of enterprises. To a certain extent, the effectiveness of GHRM depends on the importance and support of senior managers for environmental issues. The active participation of top management can provide resources and motivation for the implementation of GHRM, to better promote the improvement of corporate environmental performance (Raza&Khan,2022).

Challenges and limitations of the influence of GHRM on CEP: The full implementation of GHRM may require significant resource inputs such as training costs and the introduction of environmentally friendly technologies. In the short term, this may increase the operating costs of enterprises and reduce their incentive to improve their environmental performance (Farooq et al., 2021). Not all employees in a company have a high level of commitment to environmental protection, which can lead to resistance to the implementation of GHRM, thereby limiting its positive impact on CEP (Fawehinmi et al., 2020). Enterprises in different industries and regions pay different attention to environmental issues, which leads to the great difference in the implementation effect of GHRM. For example, telecommunications companies were likely to see more significant environmental performance gains from GHRM than service companies (Mateen et al., 2022). The literature shows that green human resource management can significantly improve the environmental performance of enterprises, but this influence is regulated and restricted by various factors. By properly implementing GHRM, companies can not only improve their environmental performance but also enhance their competitiveness and sustainability in the market.

2.7.2 The Impact of Green Human Resource Management on Green Innovation

Green innovation is an important way for enterprises to respond to environmental pressure, technological innovation, and market demand in the context of sustainable development. Green human resource management (GHRM), as an important tool to promote the green strategy of enterprises, aims to promote the green innovation capability of enterprises by managing and motivating employees (Singh et al., 2021). GHRM not only affects the green behavior of enterprises

but also stimulates the environmental awareness and innovation spirit of employees, thus promoting the development of green innovation. green innovation includes green product innovation and green process innovation (Wang & Juo, 2021). The former involves the development and design of environmentally friendly products, while the latter involves the introduction of environmentally friendly technologies and processes in production and operations to achieve resource conservation, reduce pollution, and improve ecological efficiency (Dangelico, 2016).

Research shows that GHRM has a positive impact on the green innovation of enterprises. By promoting environmental awareness among employees, providing green skills training, and establishing environmental incentives, GHRM can effectively promote green innovation activities in enterprises (Khan et al., 2022). Green recruitment not only helps to attract environmentally conscious and innovative employees but also brings a more creative and environmentally responsible team to the company. Green-conscious employees in a company were more likely to suggest new environmentally friendly products or process innovations. Through systematic green training, employees can not only master more green technology and knowledge but also enhance their sense of responsibility and creativity in environmental protection. This helps increase employees' ability to come up with green innovative ideas at work and drive improvements in green products and processes (Goh et al., 2020). Enterprises integrate green innovation goals into the performance management system and reward employees with outstanding performance in the field of green innovation through incentive mechanisms, which can further stimulate employees' enthusiasm for environmental innovation (Fawehinmi et al., 2020). This mechanism not only encourages employees to practice environmental concepts in their daily work but also inspires them to come up with innovative solutions in product design and process optimization.

GHRM influences green innovation in businesses in a variety of ways. Through green training and communication mechanisms, GHRM can enhance employees' environmental awareness and sensitivity to environmental issues. This increased awareness often leads employees to become more actively involved in green innovation activities. For example, employees with high green awareness were more likely to propose innovative green solutions at work and promote the development of green products and green technologies in the enterprise. GHRM also fosters a work environment that supports innovation by shaping the company's green culture and values. Under this culture, employees feel that the enterprise attaches great importance to green innovation, and then participate more actively in environmental technology innovation and product design. GHRM's policies and culture provide an internal driving force for innovation. green innovation often requires

cross-departmental collaboration and knowledge integration. GHRM can promote knowledge sharing and innovation ability improvement among employees by promoting green team building and cross-departmental cooperation. Especially in green technology research and development and green product design, collaborative innovation can promote the generation and implementation of innovative ideas (Singh et al., 2021).

GHRM plays a significant role in promoting green innovation. The implementation of GHRM, especially large-scale green training and incentive programs, may require a large amount of resource investment, which may increase the cost pressure of enterprises in the short term and limit the implementation effect of GHRM (Huang & Chen, 2022). Not all employees in the company have a positive attitude towards green management and green innovation. Some employees may be sceptical or even resistant to the implementation of green policies, which weaken the role of GHRM in promoting green innovation (Wang & Juo, 2021). green human resource management plays an important role in promoting the green innovation of enterprises. By raising employees' green awareness, providing motivation for innovation, and establishing green incentive mechanisms, GHRM provides important organizational support for green innovation in enterprises. However, the effectiveness of GHRM implementation was influenced by several factors, including employee innovation, external environmental pressures, and industry characteristics. With the increasing global attention to sustainable development, the research of GHRM and green innovation continued to deepen in the future and provide more theoretical and practical support for the green transformation of enterprises(Al‐Ghazali & Afsar, 2020).

2.7.3 The Impact of Green Human Resource Management on Organizational Citizenship Behaviour

In recent years, the influence of GHRM on organizational citizenship behaviour (OCB) in enterprises has attracted more and more attention. Organizational citizenship behavior refers to the voluntary behavior of employees that goes beyond their formal duties and contributes to the effective operation of the organization as a whole. GHRM contributes to the development of Green Organizational Citizenship (Green OCB) by influencing employee attitudes and behaviors, thereby enhancing environmental performance and social responsibility (Hameed et al., 2022）.

With the increasing emphasis on sustainability and environmental responsibility, researchers have proposed green organizational citizenship behavior (Green OCB), in which employees voluntarily engage in environmental protection actions beyond their job requirements. GHRM

promotes employees' environmental awareness and responsibility through recruitment, training, performance management, and incentive mechanisms, thus promoting the generation of green organizational citizenship behaviour (Ababneh, 2021).

GHRM selects employees with environmental responsibility and green values through green recruitment, and these employees were often more likely to voluntarily exhibit green organizational citizenship behavior. Studies have shown that green-conscious employees go above and beyond what their company asks them to do daily and take proactive environmental actions. By providing employees with knowledge and skills related to environmental protection, green training enhances employees' environmental responsibility and understanding of environmental issues. This increase in green awareness makes employees more inclined to demonstrate green OCB (Luu, 2019), such as reducing waste, saving energy reducing emissions, and participating in environmental protection activities. Training can also promote a better understanding of company environmental policies at work so that employees can volunteer to help colleagues understand these policies and promote green behaviour (Mansoor, Jahan, et al., 2021). Integrating green goals and behaviors into employees' performance appraisals can strengthen employees' attention to green responsibility. Under this incentive system, employees not only focused on their environmental performance but may also voluntarily go beyond these requirements and demonstrate green OCB (Organ, 1988). For example, employees may volunteer to make environmental suggestions or participate in an organization's environmental projects. By providing environmental incentives, such as bonuses and commendations related to green performance, companies can motivate employees to take proactive green actions in their daily work and show a higher level of green OCB. This incentive system can enhance the environmental motivation of employees and encourage them to volunteer to help others participate in environmental protection actions.

GHRM promotes employees' awareness of environmental responsibility through green training and promotion of the company's environmental vision and culture (Sabokro et al., 2021). This sense of responsibility not only drives employees to complete the environmental tasks at their positions but also encourage them to volunteer for more environmental activities and demonstrate green OCB (Organ, 1988). GHRM encourages its employees to exercise autonomy in their work and to come up with proposals and innovations related to environmental protection. This kind of autonomy makes employees willing to do more environmentally friendly behaviors outside of work, such as actively looking for green improvement opportunities at work or voluntarily participating in environmental protection projects, which was also one of the manifestations of green OCB. GHRM

not only focuses on environmental behavior at the individual level, but it also promotes the development of green culture throughout the enterprise through institutional and cultural construction. In this culture, employees feel that their actions can have a positive impact on the environmental performance of the organization and spontaneously exhibit green OCB. Employees maintain the company's environmental image inside and outside the organization and voluntarily spread green ideas (Podsakoff, 2000).

Green human resource management can significantly promote the occurrence of green organizational citizenship behavior by enhancing employees' environmental awareness, stimulating green motivation, and building a green culture (Zhu et al., 2021). GHRM not only drives employees to go above and beyond the call of duty at work but also influences the culture and climate of the entire organization through its management mechanisms. However, the impact of GHRM on green OCB still faces some challenges, especially in terms of implementation costs, employee acceptance, and cultural differences.

2.7.4 The Impact of Green Innovation on Corporate Environmental Performance

As global environmental issues become increasingly serious, companies need to innovate to reduce their negative environmental impact and improve their environmental performance. Green innovation involves multiple levels of improvement in technology, processes, products, and management to reduce resource consumption and pollution emissions. Green innovation is divided into green product innovation, the design and development of environmentally friendly and resource-saving products (Wang & Juo, 2021); Green process innovation, introducing environmentally friendly technologies and improving production processes to reduce pollution and resource consumption. green innovation is regarded as an effective way to improve the environmental performance of enterprises. By implementing green technology and management innovations, companies can significantly reduce environmental burdens and improve environmental compliance and resource efficiency (Latan et al.,2018).

The literature shows that green innovation has a significant positive impact on the environmental performance of enterprises. Green product and process innovation directly improves the environmental performance of companies by improving resource efficiency and reducing waste emissions during production (Meirun et a1., 2020). For example, the adoption of cleaner production technologies and environmentally friendly equipment can reduce energy consumption and waste emissions, thereby reducing the negative impact on the environment. By implementing green

innovation, companies can better comply with environmental regulations and standards and reduce the risk of fines or penalties for environmental violations (Ahmad Ullah et al., 2021). For example, with increasingly stringent emission standards, companies that adopt green innovations can meet regulatory requirements more quickly and efficiently. At the same time, green innovation helps enterprises to remain forward-looking and avoid future changes in environmental regulations. Green innovation can help enterprises establish the image of environmental protection enterprises, thus improving their competitiveness in the market (Riva et al.,2021). As consumer demand for green products increases, companies that implement green innovations were better able to meet market demand, enhance their environmental reputation, and win market share. A good environmental reputation can not only attract more consumers but also gain policy support and the favour of investors (Naz et al., 2021). Green process innovation enables enterprises to optimize internal production processes and supply chain management and reduce resource waste and production costs. This not only improves the environmental performance of the company but also enhances the overall operational efficiency of the company (Kim et al., 2019).

The implementation of green innovation is often accompanied by high initial investment costs, especially in research and development, technology introduction, and equipment renovation. For some SMEs, this high upfront investment may limit the promotion of green innovation. While green innovation can bring cost savings and benefits in the long term, short-term financial pressures remain a barrier to green innovation (Yu et al.,2021). The effect of green technology innovation is often uncertain, and enterprises may face the risk of technical failure or failure to realize the expected benefits when implementing green innovation. This uncertainty can affect investment decisions, especially for those with low-risk tolerance. Changes in government environmental policies and regulations may have a direct impact on green innovation. In the face of policy changes, enterprises may hesitate to make long-term green innovation investments, especially when the policy direction was unclear or there was a lack of continuous support, which affect the sustainable improvement of green innovation on environmental performance (Naz et al., 2021). Green innovation is widely regarded as an effective means to improve the environmental performance of enterprises. By introducing green products and process innovation, companies can reduce resource consumption, reduce pollution emissions, and improve environmental compliance and market competitiveness. However, the effectiveness of green innovation is influenced by a variety of factors, including corporate resources, external pressures, organizational culture, and technological maturity. While green innovation has significant potential to improve environmental performance, companies also face challenges related to cost and technological uncertainty in its implementation (Mansoor et al.,

2021).

2.7.5 The Impact of Organizational Citizenship Behavior on Corporate Environmental Performance

With the increase in corporate sustainability and environmental awareness, OCB is regarded as an important factor affecting corporate environmental performance (CEP). OCB's research also extends to Green organizational citizenship behavior (Green OCB), where employees voluntarily engage in behaviors that contribute to an organization's environmental goals. These green OCB may include reducing resource waste, actively participating in environmental projects, or making environmental recommendations (Luu, 2019).

The literature shows that OCBs have a positive impact on firms' environmental performance through a variety of mechanisms. These mechanisms include voluntary environmental behavior at the individual level of employees, as well as cooperation and innovation at the team and organizational level. Altruism and conscientiousness in OCB enable employees to voluntarily take environmental actions, even when they were not part of their job description. For example, employees may volunteer to reduce resource waste, save electricity, or suggest green innovations. This behavior can directly reduce the resource consumption and pollution emissions of enterprises, thereby improving environmental performance (Organ, 1988). Civic virtue and sportsmanship in the OCB contribute to a positive environmental culture within the company. Employees with this behavior not only participates in environmental activities themselves but also make the entire organization more environmentally conscious by influencing and motivating others. The formation of this green culture help enterprises achieve their environmental goals more smoothly and improve their overall environmental performance (Pham et al., 2018). Employees in the enterprise team enhance the sharing of information and knowledge on environmental protection. By actively participating in organizational affairs, employees may come up with innovative environmental solutions, which can help companies introduce new green technologies or methods into their production processes or management models to further improve environmental performance. Due diligence and courtesy in OCB can encourage employees to pay more attention to compliance with environmental regulations in their daily work, timely detection and correction of potential environmental violations, and avoid environmental penalties. This spontaneous behavior enables companies to better comply with environmental regulations and maintain a high level of environmental compliance (Pham et al., 2018).

OCB is usually spontaneous and fall outside of formal job duties. As a result, the

sustainability of the OCB may be challenged. If the enterprise lacks an effective incentive mechanism or green culture building, employees may gradually reduce such behaviors due to a lack of extrinsic rewards or intrinsic motivation. This limits the long-term impact of the OCB on environmental performance (Kim et al., 2019). The effect of OCB on environmental performance was more significant in industries with higher environmental awareness, while the effect of OCB may be limited in industries with lower environmental awareness. In addition, the cultural background of different countries and regions may also affect the performance and role of OCB (Makhloufi et al., 2021).

2.7.6 The Impact of Organizational Citizenship Behaviour on Green Innovation

Organizational Citizenship Behaviour (OCB) involves helping colleagues, being proactive, and showing initiative in various organizational activities. In environmental sustainability, OCB is related to promoting eco-friendly practices, fostering a positive work environment, and contributing to the organization's overall environmental goals (Luu, 2019). Green innovation (GI) involves the development and implementation of new processes, products, or services that contribute to environmental sustainability. It is aimed at reducing the ecological footprint of business activities and ensuring that organizations adopt greener, more sustainable practices (Pham et al., 2018). Research suggests that OCB can positively influence the adoption and implementation of green innovation within organizations. Employees who engage in OCB are often more committed to their organization's goals, including environmental sustainability initiatives. Their voluntary efforts, such as proposing green ideas, participating in environmental projects, or supporting eco-friendly behaviours at work, create an organizational culture conducive to the development of GI (Makhloufi et al., 2021).

From the perspective of RBV, organizations that foster OCB can leverage the creativity and initiative of their employees to enhance green innovation (Wang & Juo, 2021). OCB allows organizations to tap into the resource of employee-driven innovation and sustainable problem-solving, enhancing their ability to develop and implement green practices and technologies. Research suggests that OCB, particularly behaviours like helping colleagues or suggesting improvements (Zhu et al., 2021), fosters a work environment where employees were more likely to engage in GI efforts. Employees who display OCB were often proactive in identifying opportunities for innovation, including environmentally friendly innovations, contributing to a more sustainable and green organizational culture (Sabokro et al., 2021). A study found that employees' participation in environmentally-focused OCB significantly influenced the organization's adoption of green technological innovations (Singh et al., 2021). These behaviours, such as actively sharing green ideas,

participating in environmental committees, or supporting eco-friendly projects, help organizations generate new, sustainable processes or products, thus fostering GI (Ansari et al., 2022). The link between organizational citizenship behavior and green innovation was evident through theoretical and empirical research. OCB promotes a supportive and proactive work environment where green innovation can thrive. By fostering OCB through targeted organizational practices, particularly GHRM, firms can create a culture that encourages sustainability-driven innovation and contributes to improved environmental performance.

2.7.7 The Mediating Role of Green Innovation

With the increasing global environmental problems, enterprises are beginning to adopt green management strategies to improve their environmental performance. green human resource management (Green Human Resource Management, GHRM, and green innovation are key drivers of corporate environmental performance (CEP). Existing studies have shown that GHRM can indirectly promote the implementation of green innovation by motivating employees' environmental behavior and promoting enterprises' green innovation, thus affecting enterprises' environmental performance. The intermediary effect mechanism of green innovation between GHRM and corporate environmental performance was significant.

Green innovation plays a key mediating role in the relationship between green human resource management and corporate environmental performance. GHRM creates favorable conditions for green innovation by stimulating employees' green behavior and promoting the organization's environmental culture, thus improving the environmental performance of enterprises through the implementation of green innovation. green human resource management directly influences the environmental awareness and behavior of employees through a range of policies and practices, such as green recruitment, training, performance management, and incentives. By promoting employee participation in green activities and projects, GHRM can enhance a company's green innovation capabilities, thereby improving its environmental performance. Therefore, the impact of GHRM on environmental performance is not directly achieved, but through influencing other key processes and innovation practices of the firm, in which green innovation was considered to be the key mediating variable. Through green training, publicity, and performance appraisal, GHRM promotes environmental awareness among its employees and encourages them to focus on energy conservation, emission reduction, and sustainable development in their daily work. In this green cultural atmosphere, employees were more willing to participate in innovative activities and come up with ideas and solutions that contribute to environmental protection. Research shows that

the higher the environmental awareness of employees, the more likely the enterprise was to implement green innovation (Wang & Juo, 2021). GHRM encourages employees to participate in green innovation projects through incentives such as green performance awards and recognition. This incentive mechanism not only enhances the participation of employees but also encourages them to actively participate in environmentally related innovation activities, providing impetus for green innovation in enterprises (Singh et al., 2021).

Green innovation can directly improve the environmental performance of enterprises by significantly reducing their resource consumption and pollution emissions through the introduction of cleaner production technologies and environmental protection equipment. For example, green process innovation can improve the efficiency of resource utilization and reduce the negative impact on the environment by improving production processes (Singh et al., 2021). Through green innovation, enterprises can develop products that meet environmental protection requirements, attract green consumers, and enhance market competitiveness. At the same time, green innovation can also enhance the brand reputation of enterprises, enhance their environmental image in the public, and further promote the improvement of environmental performance. A large number of empirical studies have supported the mediating role of green innovation between GHRM and corporate environmental performance (Huang & Chen, 2022). GHRM has a significant positive impact on environmental performance through green innovation. It was found that enterprises implementing GHRM were more likely to improve their environmental performance through green innovation. green innovation plays a significant mediating effect between green human resource management and corporate environmental performance . GHRM promotes the generation of green innovation within enterprises by raising employees' green awareness, motivating innovation, and providing skills support, which in turn contributes to the improvement of environmental performance by reducing resource consumption, enhancing environmental compliance, and enhancing market competitiveness (Khan et al., 2019).

2.7.8 The Mediating Role of Organizational Citizenship Behaviour

OCB plays a significant role in improving organizational efficiency, promoting teamwork, and reducing conflicts. Research has shown that OCB helps to improve overall organizational performance because it creates a positive work atmosphere where employees were more willing to cooperate and organizations run more smoothly (Luu, 2019). CEP is influenced by several factors, including a company's leadership style, employees' environmental awareness and engagement, organizational culture, and government policies. Research had found that employee engagement and

behavior were critical to a company's environmental performance, so GHRM and OCB play an important role in this process (Moorman, 1995).

As a kind of spontaneous behavior, OCB can strengthen the actual effect of GHRM in enterprises. Specifically, GHRM improves employees' environmental awareness and skills through recruitment, training, incentive mechanisms, etc. However, to truly improve the enterprise's environmental performance, employees also need to show a high level of organizational citizenship behavior in actual work. If employees can actively participate in environmental protection work and exceed the formal requirements of the organization through spontaneous behavior, the environmental performance of the enterprise was significantly improved (Mansoor, Jahan, et al., 2021). GHRM can enhance employees' environmental awareness and responsibility through green training, performance appraisal, and incentive mechanisms, thus promoting the emergence of OCB. After receiving the incentive of green human resource management, employees may be more willing to show organizational citizenship behavior through spontaneous environmental protection behaviors (such as saving resources and putting forward environmental improvement suggestions). OCB directly affects the environmental performance of enterprises (Ansari et al., 2022). When employees show a high level of altruism, responsibility, civic virtue, and other behaviors, they was more willing to pay attention to environmental issues in their daily work, take the initiative to reduce resource waste and participate in environmental protection projects, which promoted the improvement of corporate environmental performance (Sun et al., 2022).

GHRM plays an important role in promoting corporate environmental management, especially in employee motivation and environmental awareness raising. Designing green recruitment and training strategies can indirectly influence employee behavior. On the role of OCB in environmental management, scholars have found that employees' environmental citizenship behavior can help improve the environmental performance of enterprises, especially when the corporate culture encourages employees to take the initiative to assume environmental responsibility (Karmoker et al., 2021). GHRM can effectively improve the environmental behavior of employees, and this behavior was often manifested in the form of OCB, and ultimately promote the environmental performance of enterprises. Through enhancing employees' environmental awareness and responsibility, GHRM further indirectly affects the environmental performance of enterprises through organizational citizenship behavior. They propose that the green incentive mechanism in the organization can effectively stimulate the environmental citizenship behavior of employees, and then promote the performance of enterprises in environmental protection. Employees' green organizational

citizenship behavior was the key mediating variable of GHRM's influence on corporate environmental performance (Ahmad et al., 2021). By studying the data of several enterprises, it was found that the voluntary environmental behavior of employees significantly enhances the positive impact of GHRM on the environmental performance of enterprises (Lin et al., 2020). Organizational citizenship plays an important mediating role between green human resource management and corporate environmental performance. By enhancing employees' environmental awareness and sense of responsibility, GHRM encourages employees to spontaneously exhibit green organizational citizenship behaviors, thus promoting the improvement of corporate environmental performance.

2.8 Conceptual Framework, Operational Definition, Hypothesis and Explanation of Hypothesis

2.8.1 Conceptual Framework

Based on the literature review and analysis of relevant research, this study proposes a conceptual research model in which corporate environmental performance is taken as an independent variable. green innovation and organizational citizenship behavior are used as intermediary variables. green human resource management is the dependent variable. The correlation between the four variables is identified.

According to the literature review and related research summary, green human resource management measures the level of human resource management adopted by enterprises to achieve environmental goals. This study focuses on green human resource management practice from the perspective of AMO Theory and RBV Theory and proposes that green human resource management practice can be used as a success factor to help Chinese telecom enterprises improve green innovation, employee citizenship and corporate environmental performance.

Based on different theoretical backgrounds and research perspectives, scholars have divided the dimensions of green innovation into green process innovation and green product innovation (Alzaidi & Iyanna, 2021; Anjum et al., 2020; Ansari et al., 2022; Awan et al., 2020; Awwad Al-Shammari et al., 2022; Fawehinmi et al., 2020; Hair et al., 2020; Haldorai et al., 2022; Hameed et al., 2022; Kim et al., 2019; Kousar et al., 2022; Kraus et al., 2020; Manzano-García et al., 2020; Naz et al., 2021; Niazi et al., 2023; Peng et al., 2020; Rehman et al., 2021; Sharif et al., 2022; Sikandar & Abdul Kohar, 2022; Singh et al., 2021; Waqas et al., 2021; Weili et al., 2022; Yu et al., 2020; Zhu et al., 2021).

Corporate environmental performance refers to the actions taken by a company to meet society's requirements for protecting the natural environment, rather than just complying with laws and regulations. It deals with the environmental impact of corporate green innovation, including processes, products, and resource consumption that comply with laws and environmental regulations. Integrating environmental sustainability issues into business operations and product development. The survey structure of environmental performance has been applied in many studies (Ubeda-Garcia et al.,2021; Wang et al., 2021). Based on the literature review, the relationships among variables are sorted out, and the conceptual model is shown in Figure 2.2.

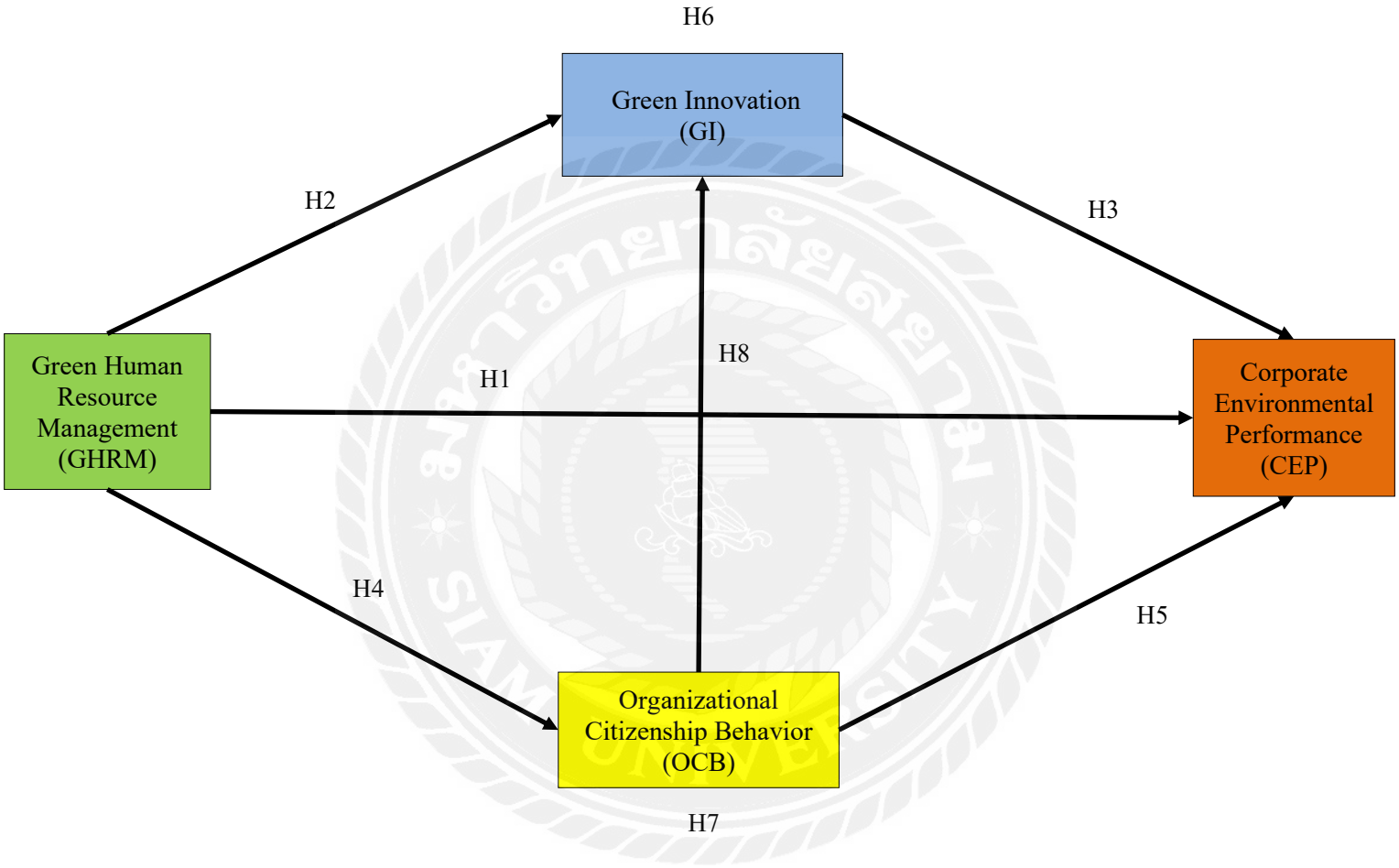

Figure 2.2 Conceptual Framework
Source: Researcher, 2025

2.8.2 Operational Definition

Green Human Resource Management (GHRM) means Human Resource Management (HRM) made by the environment "Green" or "Greening". It refers to using Human Resources Management (HRM) practices to reinforce sustainable practices, integrating Environmental Management (EM) values into HR strategies to improve Chinese telecommunication Environmental Performance (EP) and increase efficiencies. The aspects of GHRM are (a) caring for the environment, (b) protecting nature, (c) minimizing pollution, and (d) exploiting eco fields and natural human scenery. Green human resource management involves the integration of Chinese Telecommunication Enterprises' environmental management objectives into the HR processes of recruitment and selection, training and development, performance management, evaluation, and reward.

Green Innovation means the Chinese telecommunication enterprises practices focus on improving existing products and processes, making them environment-friendly. Selecting greener raw materials, avoiding waste, designing products using eco-design principles, reducing carbon emissions and footprints, and reducing consumption of water, electricity, and other raw materials is the avenue for GI.

Corporate Environmental Performance refers to the quantifiable outcomes of Chinese telecommunication enterprises' efforts to manage and reduce its impact on the natural environment. It involves assessing and improving the organization's use of resources, controlling pollution, and minimizing its ecological footprint.

Organizational Citizenship Behavior (OCB) refers to the voluntary actions and behaviors exhibited by Chinese telecommunication enterprises that go beyond their legal obligations to contribute positively to society and the environment. These behaviors reflect the Chinese telecommunication enterprises' commitment to being a good corporate citizen, meaning they act in ways that were ethical, socially responsible, and beneficial to the broader community. Green organizational citizenship behavior (Green OCB) can be defined as the voluntary, discretionary actions and behaviors exhibited by employees that go beyond their formal job requirements, aimed at promoting environmental sustainability within the organization. These behaviors include activities such as reducing energy consumption, minimizing waste, promoting eco-friendly policies, and educating colleagues on environmental practices, all with the goal of enhancing the company's environmental performance and

supporting its sustainability objectives.

2.8.3 Explanation of Hypothesis

From the above framework, the following hypotheses are formulated:

Hypothesis 1: Green human resource management has a positive impact on corporate environmental performance.

Hypothesis 2: Green human resource management has a positive impact on green innovation.

Hypothesis 3: Green innovation has a positive impact on corporate environmental performance.

Hypothesis 4: Green human resource management has a positive impact on organizational citizenship behavior.

Hypothesis 5: Organizational citizenship behavior has a positive impact on corporate environmental performance.

Hypothesis 6: Green innovation mediates the relationship between green human resource management and corporate environmental performance.

Hypothesis 7: Organizational citizenship behavior mediates the relationship between green human resource management and corporate environmental performance.

Hypothesis 8: Organizational citizenship behavior has a positive impact on green innovation.

The Operational Definition provide the strong support to the seven Hypothesis. The detailed explanation of hypothesis was as below：

Hypothesis 1: Green human resource management has a positive impact on corporate environmental performance.

It is generally believed that GHRM can significantly improve the environmental performance of enterprises. By emphasizing environmental responsibility and green ideas in green recruitment, companies can attract environmentally conscious candidates. The implementation of systematic green training by enterprises can improve the environmental protection knowledge and skills of

employees, make them pay more attention to energy saving, emission reduction, and environmental protection in their daily work, and thus improve the environmental performance of enterprises. By integrating environmental objectives into employees' performance appraisal systems, companies can encourage employees to pay attention to environmental protection in their work, and thus promote better environmental performance. By promoting environmental awareness and skills, GHRM enables employees to adopt more sustainable behaviors in their daily work. This kind of behavior change can greatly help improve the environmental performance of enterprises. The full implementation of GHRM may require significant resource inputs such as training costs and the introduction of environmentally friendly technologies. Telecommunications companies were likely to gain more significant environmental performance gains from GHRM than service companies. The literature shows that green human resource management can significantly improve the environmental performance of enterprises, but this influence was regulated and restricted by various factors. By properly implementing GHRM, companies can not only improve their environmental performance but also enhance their competitiveness and sustainability in the market.

Hypothesis 2: Green human resource management has a positive impact on green innovation.

GHRM has been recognized as an essential strategy for implementing GI that improves CEP and achieves long -term environmental stability (Kalei, 2024; Ren et al., 2022). GI was the introduction of eco-friendly processes and products through the implementation of GHRM practices and policies such as the use of eco-design approach and principles, greener raw materials, and a set target to reduce pollution of water, electricity and carbon emission (Albort-Morant et al., 2016; Sharif et al., 2022; Sikandar & Abdul Kohar, 2022) Extant studies have argued that firms that practice GI were highly successful in their overall CEP (Allameh, 2018; Singh et al., 2020). Thus, such firms leverage GHRM practices and GI to respond quickly to the appropriate demand from stakeholders and customers. As stipulated by the RBV, GI was an asset and value that firms use to gain a competitive advantage over rival enterprises (Song et al., 2020).

Environmental literature suggests that GHRM practices can positively influence GI (Ansari et al., 2022; Ercantan & Eyupoglu, 2022; Hussain et al., 2018; Rehman, et al., 2021; Singh et al., 2022), implying that complementary adoption of GHRM practices can have a greater influence on firms' GI. Moreover, GHRM can enhance staff empowerment, motivation, opportunity, and ability, promoting their novel and unique knowledge about GI (Song et al., 2020). Hence, drawing upon the AMO (Koeber et al., 2001) and RBV (Barney et al., 2001), this research predicts that leverage and

value the potential of their GHRM practices can result in higher GI among employees.

Hypothesis 3: Green innovation has a positive impact on corporate environmental performance.

RBV Theory argues that enterprises should emphasize and evaluate those important initiatives that cause environmental pollution (Akram et al., 2022; Hart, 2020). The theory further suggests for firms to improve on their CEP, then they must focus on these three unique ideas; (l) produce environmentally friendly products, (2) mitigation of pollution in the environment, and (3) involve in product stewardship (Makhloufi et al., 2022; Rehman et al., 202l). Based on RBV, this thesis argues that GI was an essential strategic action that firms can apply to provide solutions to achieve the three criteria described above. GI involves the maintenance of the natural ecosystem and rationalization of natural resources through the improvement of efficient utilization of resources, GI enable firms to exploit high market opportunities and increase firms 'advancement in terms of their CEP (Rehman, et al., 2021). The rapid increase in business activities had recently caused ecological challenges to society. Hence firms were finding a better alternative that can help provide a better solution to this menace. GI had therefore been suggested as the best strategy to overcome environmental challenges (Bag et al., 2022; Xie et al., 2019).

CEP relates to the environmental impact of firms' GI, which includes processes, products, and consumption of resources in a manner that aligns with legal and environmental regulations (Wang, Van der Werff, et al., 2021). Extant studies have indicated that CEP was linked to the quality of environmentally friendly materials, GI, and the inclusion of environmental sustainability issues into business operations and product development (Fernando et al., 2019.Iqbal et al., 2021; Khan et al., 2022; Singh et al., 2020, Song et al., 202l). Hence applying the RBV theory, this thesis predicts that GI was an essential resource corporate can adopt to improve their CEP.

Hypothesis 4: Green human resource management has a positive impact on organizational citizenship behavior.

According to existing research, GHRM contributes to the development of green organizational citizenship behavior (Green OCB) by influencing employee attitudes and behaviors, thereby enhancing corporate environmental performance and social responsibility (Elshaer et al., 2021). Through recruitment, training, performance management, and incentive mechanisms, GHRM enhances employees' environmental awareness and responsibility, thus promoting the generation of

green organizational citizenship behavior. Based on the Resource-Based View (RBV), green human resource management is considered to be a key strategy to promote the civic behavior of green organizations (Ubcda-Garcia et al.,2021). Through green recruitment, GHRM selects employees with green values, who tend to be more willing to proactively make recommendations related to environmental protection and demonstrate green OCB in their daily work. GHRM also promotes green awareness among employees through training and performance management, encouraging them to seek out green improvement opportunities at work or volunteer to participate in environmental projects (Hameed et al.,2021). This autonomy and innovation enable employees not only to demonstrate green behavior within the organization but also to maintain the company's environmental image outside the organization and actively spread green ideas. Based on the perspective of RBV theory (Farooq et al., 2021), GHRM significantly promotes the emergence of green organizational citizenship behavior by enhancing employees' environmental awareness, stimulating green motivation, building green culture, and helping enterprises achieve higher environmental performance and sustainable development goals.

Hypothesis 5: Organizational citizenship behavior has a positive impact on corporate environmental performance.

According to existing research, organizational citizenship behavior (OCB) positively influences the environmental performance of enterprises through a variety of mechanisms. Altruism and conscientiousness in OCB motivate employees to take the initiative to reduce resource waste, save energy, or suggest green innovations (Nassani et al., 2022). This kind of behavior can directly reduce the resource consumption and pollution emissions of enterprises, thus improving environmental performance. Civic virtue and sportsmanship in the OCB contribute to a positive environmental culture within the company. Employees not only practice environmental behavior themselves but also influence others to make the entire organization more environmentally conscious (Elshaer et al., 2021). The formation of this green culture helps enterprises to achieve their environmental goals more effectively, thus improving their overall environmental performance. OCB also promotes teamwork and innovation by facilitating environmental information sharing and knowledge dissemination among employees. Employees propose new environmental solutions through active participation in the organization. Due diligence and courtesy in the OCB encourage employees to pay more attention to compliance with environmental regulations and to detect and correct potential environmental violations promptly (Meirun et a1., 2020). This spontaneous behavior ensures that companies maintain high levels of environmental compliance and enhance their overall

environmental performance.

Hypothesis 6: Green innovation mediates the relationship between green human resource management and corporate environmental performance.

GHRM can indirectly promote the implementation of green innovation by motivating employees' environmental behavior and promoting corporate green innovation, thus affecting the environmental performance of enterprises. The intermediary effect mechanism of green innovation between GHRM and corporate environmental performance was significant. The higher the environ mental awareness of employees, the more likely the enterprise was to implement green innovation (Huang & Chen, 2022). GHRM encourages employees to participate in green innovation projects through incentives such as green performance awards and recognition. This incentive mechanism not only enhances the participation of employees but also encourages them to actively participate in environmentally related innovation activities, providing impetus for green innovation in enterprises (Sun et al., 2022). green innovation can directly improve the environmental performance of enterprises by significantly reducing their resource consumption and pollution emissions through the introduction of cleaner production technologies and environmental protection equipment. Companies that implement GHRM tend to be more likely to improve their environmental performance through green innovation. GHRM promotes green innovation within the organization by raising employee awareness, motivating innovation, and providing skills support (Fawehinmi et al., 2020), which in turn reduces resource consumption, enhances environmental compliance, and improves market competitiveness.

Hypothesis 7: Organizational citizenship behavior mediates the relationship between green human resource management and corporate environmental performance.

As a kind of spontaneous behavior, OCB can strengthen the actual effect of GHRM in enterprises. GHRM promotes employees' environmental awareness and skills through recruitment, training, and incentive mechanisms. Employees show a high level of organizational citizenship behavior in their actual work (Farooq et al., 2021). If employees can actively participate in environmental protection work and exceed the formal requirements of the organization through spontaneous behavior, the environmental performance of the enterprise was significantly improved. On the role of OCB in environmental management, scholars found that employees' environmental citizenship behavior can help improve the environmental performance of enterprises. GHRM can effectively improve the environmental behavior of employees, and this behavior was often

manifested in the form of OCB (Haldorai et al., 2022), and ultimately promote the environmental performance of enterprises. Through enhancing employees' environmental awareness and responsibility, GHRM further indirectly affects the environmental performance of enterprises through organizational citizenship behavior. By enhancing employees' environmental awareness and sense of responsibility (Wang & Juo, 2021), GHRM encourages employees to spontaneously exhibit green organizational citizenship behaviors, thus promoting the improvement of corporate environmental performance.

Hypothesis 8: Organizational citizenship behavior has a positive impact on green innovation.

The rationale behind this hypothesis is that employees who engage in OCB, such as being proactive, helping colleagues, and supporting organizational goals, were likely to contribute to green innovation. Their voluntary efforts extend to participating in environmental initiatives, suggesting green ideas, and supporting eco-friendly behaviors, which help create a work culture that fosters green innovation. When employees go beyond their formal responsibilities and actively engage in sustainability-driven actions, it leads to the development of new green technologies and practices within the organization (Luu, 2019). Research shows that OCB taps into employees' creativity and initiative were essential for generating innovative, sustainable solutions. By fostering a culture where these behaviors were valued and encouraged, organizations can enhance their ability to implement green innovations. For instance, employees displaying OCB, such as helping colleagues or proposing improvements, contribute to a work environment that facilitates the identification of opportunities for GI (Wang & Juo, 2021; Zhu et al., 2021). Studies have confirmed that OCB positively influences the adoption of green practices. Employees' contributions in areas like sharing green ideas and supporting eco-friendly projects play a significant role in advancing organizational green initiatives. Singh et al. (2021) found that employees' participation in environmentally-focused OCB was key to the adoption of green technological innovations, while Ansari et al. (2022) highlighted how such behaviors can help generate new, sustainable processes and products.

CHAPTER 3
RESEARCH METHODOLOGY

This chapter discusses the research method, the population and sampling method, data collection, operationalization of variables, questionnaire, research hypotheses, the analytical model, and the statistical analysis method.

3.1 Research Design

3.2 Quantitative Research

3.3 Qualitative Research

3.4 Development of Corporate Environmental Performance Model

3.5 Research Ethics

3.1 Research Design

This study adopted a mix- methods research design. The research process had two phases. The first stage was a quantitative method. The first part was literature review, including green human resource management, green innovation, organizational citizenship behavior, corporate environmental performance, and then, a conceptual framework for this study was developed. A questionnaire was designed based on the Likert method (Likert, 1932) with reference to 5 scales. Then, the questionnaire was tested for validity and reliability. Finally, data collection and statistical analysis were carried out. The data were further analyzed using descriptive statistics and Structural Equation Models. The second stage involved an interview method to discuss the findings and identify the measures in each of the research variables. The research model was refined to better guide practice.

The questionnaire consisted of two parts. The first part was the control variables, including gender, age, and work experience of the sample. The second part was about green human resource management (GHRM), corporate environmental performance (CEP), and green innovation (GI), and organizational citizenship behavior (OCB). For qualitative research an interview guideline was set covering green human resource management (GHRM), corporate environmental performance (CEP), green innovation (GI), and organizational citizenship behavior (OCB).

The researcher further proofread the questionnaire to correct grammatical errors. Subsequent studies have indicated that the researcher should consider the respondents' educational experience and level in designing the questionnaires. The language used and the context of the questionnaire should be familiar to the participants (Rowley, 2014). Hence, this study's questionnaire was structured without technical language, but easy-to-understand questions were used. The questionnaire was “closed-ended," from which the participants could select various options. The study's measuring constructs used a 5-point Likert scale (l, strongly disagree; 2, disagree; 3, neutral; 4, agree, and 5, strongly agree). To analyze the research gathered data, the researcher converted the responses into codes.

To effectively implement the interview method, this study adopted a structured and interactive approach involving 12 HR managers or related managers from Chinese telecommunication enterprises. Participants were selected based on their expertise in environmental management and strategic decision-making, ensuring diverse representation across different regions and business functions. Before the session, quantitative research findings and key discussion points were compiled into a concise document and distributed to all participants one week in advance, giving them sufficient time to review, reflect the results and make suggestion.

The interview session started with a brief introduction outlining the study’s objectives and the role of participant feedback in refining the research framework. This was followed by an evaluation segment where participants shared their assessments of the findings, identify areas for improvement, and suggest additional factors to enhance corporate environmental performance strategies. An open discussion encouraged an exchange of perspectives to jointly identify actionable insights for refining the model. Guiding questions such as the relevance of findings, missing variables, and industry-specific practices were used to steer the discussion. Data collection involved detailed note-taking and audio recordings (with participant consent), and thematic analysis was conducted to extract key insights. A summary report capturing major discussion points and actionable recommendations was shared with participants for validation. These insights were integrated into the research framework to enhance its robustness and practical relevance, providing a more comprehensive model for evaluating and guiding corporate environmental performance in Chinese telecommunication enterprises.

3.2 Quantitative Research

3.2.1 Population and Sample

3.2.1.1 Population

Population in the research context was formed by selecting individuals or groups with an identified interest and similar characteristics. Thus, an identified population shares a specific trait or feature which was in congruence with the study's research objectives and questions. Since the primary objectives of this study were to examine the factors that contribute to CEP, the researcher identified managers in telecommunications companies (China Unicom, China Telecom, and China Mobile) in China as the targeted population. The selection of telecommunications companies (China Unicom, China Telecom, and China Mobile) was imperative because of the country's current level of environmental pollution through telecommunication and communication activities.

The selection of telecommunications companies (China Unicom, China Telecom, and China Mobile) as the population target was justifiable due to this sector's contribution to economic development in China. Despite these contributions, there is a need to find appropriate ways to curb the telecommunications companies' sector's pollution challenges. Moreover, recent policy-makers, stakeholders, investors, consumers, and government have raised concerns about the country's environmental challenges. As a result, evaluating the OCB of managers who work in these companies are critical for the environmental sustainability progress of the nation. Moreover, previous studies that explore OCB, GI, GHRM, and CEP also indicated that telecommunications companies' CEP and managers' OCB and GI were worthy of examination to help provide a better solution for the up surging environmental issues confronting the globe (Latif et al., 2022; Waqas et al., 2021; Yahya et al., 2022).

After identifying the population, it was important to analyze which sampling technique and sample size to use in the research. Thus, the sample size of the study was selected through the stratified sampling approach. The stratified sampling technique categorizes a demographic into subsets known as strata. The various strata were formed during the stratification process depending on the group members' shared features. One significant advantage of this sampling technique was that it allows the researcher to acquire as ample population that accurately represents the entire population under study (Anjum et al., 2020; Kousar et al., 2022). In addition, instead of choosing the whole sample or the entire population, the stratified sampling approach helps the researcher to evaluate a smaller proportion comprising several traits such as behavior, demographics, and background information relevant to the research goal (Nzabamwita, 2021; Sarmawa et al., 2020). The sample size consisted of telecommunications companies (China Unicom, China Telecom, and China Mobile). The number of managers of China's three telecommunication companies was 10,982 people

(163.com/dy/article/IR53TP930511N341.).

3.2.1.2 Sample for Quantitative Research

The study adopted the Krejcie & Morgan (1970) estimation method to estimate the sample size. This estimation approach extended by the scholars suggested that with a population of more than 10,000 respondents within the margin error of 5% and a confidence interval of 95%, a researcher needs not less than 398 responses. The estimation technique for the sample size, as suggested by Krejcie & Morgan (1970), is presented in equation as follows:

$$S.Z = \frac{(X)^2(p)(1-p)(n)}{(X)^2(p)(1-p) + (n)(ME)^2} = 398.912$$

$S.Z$ represents sample size, X^2 represents the chi-square at a 1%-degree confidence level, n denotes the population size, P implies the population proportion, and ME outlines the desired margin of error represented as a proportion of the sample size. Hence, to gather accurate data and cover issues such as incomplete, unreturned, and unanswered questionnaires, the study increased the sample size to 400 respondents (managers) from different telecommunications companies (China Unicom, China Telecom, and China Mobile) in China. Accordingly, through the stratified sampling technique, the researcher divided the sample size into three different clusters based on the different companies as presented in Table 3.1.

Table 3.1 Stratification of the Sample Size

No.	Enterprises	Number of Manager	Percentage	Sample Size
1	China Unicom	2,445	22.26%	89
2	China Mobile	4,522	41.17%	165
3	China Telecom	4,015	36.56%	146
TOTAL		10,982	100%	400

Source: Researcher' Compilation

3.2.2 Questionnaire

3.2.2.1 Green Human Resource Management

The GHRM scale consists of eight items retrieved from previous research (Renet al., 2022; Bin Saeed et al., 2019).

Table 3.2 Green Human Resource Management Measurement Items

Construct	Item	Item Code
Green Human Resource Management (GHRM)	At our enterprise, environmental issues were a necessity for job descriptions.	GHRM1
	My firm chooses candidates that were sufficiently knowledgeable about greening to fill open positions.	GHRM2
	Recruitment communications incorporate environmental commitment and conduct requirement.	GHRM3
	This firm establishes an environment management system and environmental audit.	GHRM4
	Our enterprise engages the employee in establishing environmental strategies.	GHRM5
	Our firm recognizes employees as essential actors in environmental decisions and initiatives.	GHRM6
	Our enterprise provides ecological education to employees promptly and frequently.	GHRM7
	Compared to other firm training programs, environmental training was given priority	GHRM8

Source: Renet al., 2022; Bin Saeed et al., 2019

3.2.2.2 Corporate Environmental Performance

The scale for environmental performance was deployed in erstwhile studies (Ubeda-Garcia et al, 202l; Wang et al, 202l).

Table 3.3 Corporate Environmental Performance Measurement Items

Construct	Item	Item Code
Corporate Environmental Performance (CEP)	Our enterprise minimizes the influence of its product and procedures on the environment.	CEP1
	Our firm had switched to a renewable power source and reduced its use of fossil fuel.	CEP2
	The current business operations of our firm were automated.	CEP3
	Our enterprise had drastically decreased the amount of solid waste it produces.	CEP4
	Our business uses ecologically friendly methods to dispose of waste.	CEP5
	Our firm had mitigated its overall waste, emission, use of toxic and hazardous materials.	CEP6

Source: Ubeda-Garcia et al., 202l; Wang et al., 202l

3.2.2.3 Green Innovation

The GI items were obtained from the studies of Fatoki (2021), Makhloufi et al. (2022).

Table 3.4 Green Innovation Measurement Items

Construct	Item	Item Code
Green Innovation (GI)	Our enterprise had enhanced environmentally friendly packaging for both used and new product line.	GI1
	Our enterprise produces goods and offers services while taking ecological considerations into mind.	GI2
	Our enterprise uses repurposed and recycled materials when providing services to consumers.	GI3
	Our enterprise uses modern technology to neutralize pollution	GI4
	Our enterprise was better able to meet the needs of its customers by lowering emissions of harmful substances and pollution	GI5

Source: Fatoki, 2021; Makhloufi et al. 2022

3.2.2.4 Organizational Citizenship Behaviour

This study, drawing on the views of Boiral and Paillé (2012), defines organizational citizenship behavior (OCB) as the conscious act of managers at the workplace who demonstrate enthusiasm for the environment and promote sustainable development of the organization beyond the requirements of the organization's regulations.

Table 3.5 Organizational Citizenship Behavior Measurement Items

Construct	Item	Item Code
Organizational Citizenship Behavior (OCB)	Before doing something that may affect the environment in my work, I will weigh the consequences of my actions.	OCB1
	In my daily work, I voluntarily implement environmental protection actions and initiatives.	OCB2
	I suggest to my colleagues how to protect the environment more effectively, even if It was not my responsibility.	OCB3
	I participate in environmental activities organized by our company.	OCB4
	I keep myself informed of the company's environmental protection initiatives.	OCB5
	I take environmental protection actions that contribute positively to the image of our company.	OCB6
	I voluntarily participate in projects or activities	OCB7

Construct	Item	Item Code
	that address environmental issues in our company.	
	I spontaneously spend time helping my colleagues to consider the environment in everything they do at work.	OCB8
	I encourage my colleagues to adopt more environmentally friendly behaviors.	OCB9
	I encourage my colleagues to express their thoughts and opinions on environmental issues.	OCB10

Source: Boiral and Paillé (2012)

3.2.2.5 Control Variables

Extant studies have indicated that other control factors can influence green-related behavior and CEP (Chen & Cao, 2023; Song et al., 2023). Thus, variables such as education background, age, experience, and gender might affect the research outcome (Peng et al., 2020). Therefore, controlling these factors is essential in the research model. Hence consistent with existing studies, this study controlled these variables (age, educational background of managers, and gender) to evaluate their potential influence on firm environmental performance (Alzaidi & Iyanna, 2021; Luu, 202 0; Vamvaka et al., 2020).

3.2.3 Quality of Questionnaire

To assess the quality of the research instrument, the questionnaire underwent content validity testing, reliability testing, and exploratory factor analysis.

(1) Content Validity

Content Validity (CV) helps analyze a selected technique a researcher applies to appropriately achieve structural integrity among the constructs under consideration in research. When the research outlines the reflective and formative constructs, examining the integrity of the constructs was essential and crucial (Su et al., 2021). CV enables the researcher to evaluate the measurement tools of the research and ensure that it includes all the significant scales and provides an opportunity to eliminate undesirable items in a particular construct (Taherdoost, 2016). Each construct's factor loadings must be assessed to measure the construct's CV. Extant literature had ascertained that the CV of each construct must exceed the threshold of 0.70 (Hair et al.2020). CV was a technique used to summarize a plethora of variables into a controllable number of components. This method produces a single score by combining the factors' largest common variance (Ronkko & Cho, 2020). By employing statistical methods to look at the subscales that characterize the interconnections

between the numerous items, factor analysis enables us to simplify a group of output variables or items. To generate and improve tools to measure and validate the reliability and validity of the measure, CV was a commonly used and acknowledged approach (Tavakol & Wetzel, 2020).

(2) Logical Validity

Based on the expert panel evaluation, a measure of the consistency of each item in the questionnaire with the overall construct being measured was obtained by calculating the item objective congruence (IOC) (Turner & Carlson, 2003). A value of IOC between 0 and 1 indicate strong congruence between the item and the overall construct being measured. Items with IOC values above 0.30 are generally considered to have acceptable congruence, while items above 0.50 items are very good.

This study calculated the IOC values to determine the content validity, using the following formula.

$$IOC = \frac{\Sigma R}{n}$$

where IOC = Index of item-objective congruence value

R = Score from experts

ΣR = Total score from all experts

n = number of experts

The following steps were taken.

1) Send the questionnaire to five experts for evaluation:
    1. Dr. Zhang Kai
    2. Dr. Burin Santisarn
    3. Dr. Karnjira Limsiritong
    4. Dr. Siwei Dong
    5. Dr. Han Deng

Criteria to verify the score was

+1 means "the measurement item was in congruence with the objectives of the study"

0 means "the measurement item was undecided."

-1 means "the measurement item was inconsistent with the objectives of the study"

IOC needs to be between 0.5-1.00 for every item.

2) Calculate the IOC value and use the following criteria.

- Means between 0.5-1.00 means the measurement items pass the evaluation.
- Means below 0.5 means the measurement items need to change or replacement.
- Less than 0 means the measurement items fail the evaluation.

3) Select the items with the IOC value from 0.5-1.00.

(3) Reliability Testing

Testing for reliability and internal consistency enables the researcher to evaluate the extent to which a phenomenon's scale provides consistent and stable outcomes (Taherdoost.2017). A construct is identified as having a higher level of internal consistency when the scale items "hang together" and measure the same construct. The Cronbach's alpha (CA) statistical value is the most widely used internal consistency measurement tool, calculated with the following formula.

$$\alpha = \left[\frac{n}{(n-1)}\right]\left[1 - \frac{\sum_{i=0}^{n} / S_i^2}{S_t^2}\right]$$

where α = a coefficient of reliability
n = the number of informants
$\sum_{i=0}^{n}$ = the variance of the sum of informants
S_i^2 = the ratio of the variance of each informant
S_t^2 = the ratio of inter-informants' variance

CR test was also conducted to examine the internal reliability, and as proposed by Manley et al. (2020), the CR statistical value should exceed 0.70. In addition, in an exploratory study, if the CR value was greater than 0.95, it indicates that the scale had some underlying problem. Hence, a CR co-efficient above 0.70was identified as satisfactory (Rehman, et al., 2021). Hence, the statistical values of all the constructs were within the recommended threshold, inferring that the scales have internal reliability among the constructs.

The next phase was to assess the convergent validity among the study indicators. Convergent validity assesses the likelihood with which a measure interacts to understand further its items' variability (Chin, 1998; Hair et al. 2020). The AVE for all items on each construct was the criterion used to assess convergent validity. The AVE was computed by squaring the loading of each indicator

on a construct and computing the mean value. The AVE must be0.50 or higher to be considered acceptable. An AVE of 0.50 or higher indicates that the construct explains 50% or more of the variance of the items that make up the construct (Hair et al., 2020).

3.2.4 Data Analysis

The questionnaire consists of 5 parts as follows:

Part 1: General information of the respondents

It includes gender, age, marital status, education, monthly income, working experience, department, province, number of employees and company total income.

Part 2: The opinions and attitudes toward green human resource management (GHRM). The rating scale with 5 levels is as follows:

Level	Score
Strongly Agree	5
Agree	4
Neutral	3
Disagree	2
Strongly Disagree	1

The meaning of each score would be

Score 5 means respondents strongly agree with the statement

Score 4 means respondents agree with the statement

Score 3 means respondents are undecided with the statement

Score 2 means respondents disagree with the statement

Score 1 means respondents strongly disagree with the statement

The interpretation of the score is:

Mean	Significance Level
1.00 - 1.80	Strongly Disagree
1.81 - 2.60	Disagree
2.61 - 3.40	Undecided
3.41 - 4.20	Agree
4.21 - 5.00	Strongly Agree

Part 3: The opinions and attitudes toward corporate environmental performance (CEP). The answers are based on the five-rating scale from Strongly Disagree, Disagree, Undecided,

Agree, Strongly Agree.

Part 4: The opinions and attitudes toward green innovation (GI). The answers are based on the five-rating scale from Strongly Disagree, Disagree, Undecided, Agree, Strongly Agree.

Part 5: The opinions and attitudes toward organizational citizenship behavior (OCB). The answers are based on the five-rating scale from Strongly Disagree, Disagree, Undecided, Agree, Strongly Agree.

To analyze quantitative data, the following step were applied.

1) Analyze the general information of the respondents by Frequency and Percentage.
2) Analyze the variables by Mean and Standard Deviation (SD)
3) Analyze the relationships between variables by Correlation Coefficient or Pearson Correlation (r)
4) Conduct confirmatory factor analysis (CFA) by AMOS using the criteria of factor loading values at 0.5 for the quality of questionnaire.
5) Conduct CR test to examine the internal reliability, and as proposed by Manley et al. (2020), the CR statistical value should exceed 0.70.
6) Compute AVE for all items on each construct.
7) Conduct structural equation model analysis and verify the hypotheses.

3.3 Qualitative Research

3.3.1 Interview

The results of the quantitative were formed into a guideline, and the results were validated through semi-structured interviews.

In this study, the interview protocol was a critical component of the qualitative research method, aimed at collecting experience-based insights regarding green human resource management (GHRM), green innovation (GI), organizational citizenship behavior (OCB), and corporate environmental performance (CEP). The design of the interview protocol considered the research objectives, core themes of inquiry, and the participants' backgrounds to ensure that rich, relevant, and representative qualitative data were obtained.

(1) Purpose of the Interviews

The primary objectives of the interviews were:

•To explore the relationship between GHRM, green innovation, organizational citizenship behavior, and corporate environmental performance, understanding how these factors interacted and contributed to improving environmental performance within Chinese telecommunications enterprises.

•To gain an in-depth understanding of managements and employees' experiences with GHRM practices, particularly in recruitment, training, performance evaluation, and green compensation systems.

•To gather feedback on the effectiveness of green management policies, and explore how employee behavior and innovation practices could enhance corporate environmental performance.

(2) Interviewees

The interviewees included 12 senior and middle-level managers from the Chinese telecommunications industry who played key roles in the implementation and oversight of green management strategies. Participants were selected based on the following criteria:

•A minimum of five years of management experience in the telecommunications sector, ensuring a thorough understanding of industry-specific green management practices and challenges.

•Familiarity with their company's GHRM policies and initiatives, including recruitment, training, performance evaluation, and green compensation systems.

•Decision-making power and strategic insight, particularly HR managers and related managers (e.g., department and project managers), who possessed the ability to provide expert-level feedback on the company's environmental performance and employee behavior.

(3) Interview Framework

The interviews were guided by open-ended questions centered around the following themes:

•The impact of GHRM practices on employee environmental awareness and behavior: Exploring how the company integrated green practices into recruitment, training, and performance evaluations to cultivate employees' environmental consciousness and behaviors.

•The mechanisms driving green innovation (GI): Exploring how the company fostered green technology, product development, and sustainable practices, and how employees contributed to innovation that supported the company's environmental goals.

•The relationship between organizational citizenship behavior (OCB) and environmental performance: Discussing how voluntary employee behaviors contributed to the implementation of green strategies and enhanced the organization's overall environmental performance.

•Challenges and opportunities in implementing green management strategies: Asking participants about the challenges they faced in executing green management practices and the potential opportunities for improvement, especially related to talent management and organizational culture.

(4) Interview Method

The interviews adopted a semi-structured format, using a combination of open-ended questions and guided discussions to allow participants to express their views freely while keeping the conversation aligned with the research objectives. The specific steps of the interview process included:

•Introduction phase: Introducing the research objectives, interview process, confidentiality, and participants' rights to ensure voluntary participation.

•Discussion phase: Engaging in discussions based on the prepared interview guide, using open-ended questions to encourage participants to share in-depth insights on GHRM, GI, and environmental performance.

•Summary phase: Summarizing key points from the discussion, soliciting any additional comments from participants, and thanking them for their contributions.

(5) Data Analysis Method

The interview data were analyzed using NVivo14 software, applying a three-stage coding process:

•Open Coding: Initially categorizing the interview data into relevant themes and topics.

•Axial Coding: Identifying relationships between the themes and grouping them into broader categories.

•Selective Coding: Summarizing key findings, focusing on the critical relationships between GHRM, green innovation, and corporate environmental performance.

Through this interview protocol, the study aimed to gain a deeper understanding of the practical implementation and effects of green management practices within the telecommunications industry, and provide theoretical and practical insights for future green human resource management policies.

3.3.2 Analysis of Interview Results

(1) Familiarization with Data: The researcher first read through the verbatim transcriptions to gain a preliminary understanding of the discussion content and main viewpoints.

(2) Coding: Preliminary coding was conducted based on key concepts emerging from the discussions. For example, the effectiveness of green innovation, the impact of organizational citizenship behavior on environmental performance, etc.

(3) Theme Induction: Combining the coding results, several core themes were induced. Possible themes include "The impact of green management practices on corporate environmental performance," "The driving role of employee behavior in green innovation," etc.

(4) Theme Review and Definition: The research team discussed and verified the rationality of the themes to ensure that each theme can explain the main findings from the Interview discussions.

(5) Interpretation of Results: The results of the qualitative data analysis were compared with the preliminary findings from the quantitative research to explore consistencies and differences, and to summarize the implications for both theory and practice.

3.4 Development of Corporate Environmental Performance Model

The development of the corporate environmental performance Model involved a comprehensive process that integrated both qualitative and quantitative analyses to identify and confirm the factors influencing the model and further refine it. Here was a detailed explanation of the process:

Based on the insights from the qualitative analysis, the researchers selected relevant variables to measure the factors influencing corporate environmental performance. The researchers used various statistical methods to analyze the data and confirm the factors influencing the model. The green human resource management (GHRM), corporate environmental performance (CEP), and green innovation (GI), Four variables of organizational citizenship behavior (OCB) were investigated using a five-point Likert scale. According to AMO Theory and Resource-Based View (RBV) Theory, the structural equation model (SEM) was used to study the relationship between the variables. A hypothesis was proposed based on the interaction between the variables.

The qualitative insights from the FGDs provided a theoretical understanding of how GHRM practices influence performance and helped to identify the key factors to be included in the quantitative analysis. The quantitative analysis, in turn, confirmed the significance of these factors and provided empirical evidence for their impact on corporate environmental performance. By integrating the qualitative and quantitative findings, the researcher was able to refine the corporate environmental performance model and develop a more comprehensive and accurate representation of the relationships between GHRM, GI, OCB, and corporate environmental performance.

The combined qualitative and quantitative approach allowed the research to contribute theoretically and practically. The findings were a foundation for developing subsequent quantitative models to measure and improve green management practices within organizations, guiding future strategies for improving environmental performance in the telecommunications sector. The insights gained from the study can help companies in the telecommunications industry and beyond to understand the factors that drive environmental performance and to develop more effective green management strategies.

3.5 Research Ethics

The research committees at the institutions involved in the study provided ethical approval prior to data collection. Ethical approval was granted by the Panyapiwat Institute of Management Research Ethics Committee (PIM-REC) under Certificate ID: PIM-REC 025/2568.

All respondents were asked for a verbal and written agreement after being told about the nature of the research and how it was conducted to avoid personal identification. Ethical issues were essential and must be addressed, especially when conducting quantitative research. Stedmon & Paul (2021) indicated that researchers must respect respondents' needs, rights, values, and privacy. Sonmez (2013) suggested several ethical issues researchers should consider collecting and analyzing their study data. These issues include informed consent, harm and risk, trust and honesty, confidentiality, privacy, and anonymity. Therefore, the participants of this study were assured that their responses would be kept private to overcome these ethical concerns. Furthermore, the research data were collected anonymously, and respondents provided their responses voluntarily. The information sheet and consent form were sent to the participants of this study.

CHAPTER 4

RESEARCH RESULTS

This chapter primarily focuses on the analysis of collected data, comprising five sections:

4.1 Demographic Characteristics of Respondents

4.2 Normality Test of Data Distribution

4.3 Discriminatory Power, Reliability Analysis and Validity Analysis

4.4 Correlation Analysis

4.5 Structural Equation Models and Hypothesis Testing

4.6 Qualitative Data Analysis

4.7 Integration of Qualitative and Quantitative Analysis Results

This study adopted the mixed-methods research. The quantitative research used a questionnaire as a research tool, combined with SPSS26 software and structural equation model to analyze the relationship and influence path between green human resource management, green innovation, organizational citizenship behavior, and corporate environmental performance. The qualitative research used Nvivo 14 software to analyze in-depth interview results from managers. Finally, a theoretical model was proposed to enhance the competitiveness of Chinese telecommunications companies.

4.1 Demographic Characteristics of Respondents

The sample comprised 399 respondents from Chinese telecom enterprises, presenting a balanced gender distribution with 204 males (51.13%) and 195 females (48.87%). The age structure revealed that the majority fall within the 31–40 age group (48.62%), followed by 41–50 (34.84%), with only a small portion aged 18–30 (3.51%) and those above 50 (13.03%). This suggests that the workforce is predominantly composed of experienced middle-aged professionals, likely occupying stable and critical roles within their organizations.

Regarding marital status, 66.42% of respondents are married, 28.57% are

divorced, 3.51% are single, and 1.50% are separated, indicating that most respondents may have familial responsibilities, which could potentially influence their perceptions and behaviors toward organizational policies and green initiatives.

In terms of education, a significant portion (45.87%) have education levels under a bachelor's degree, while 32.83% hold a bachelor's degree, and 21.30% possess postgraduate qualifications or higher. This reflects a relatively diverse educational background, with a notable portion of the workforce still situated below the threshold of higher education, which may influence their understanding and engagement with complex green management practices. Income distribution indicates that 50.88% earn between 5,001 and 10,000 yuan per month, followed by 41.60% earning below 5,000 yuan. Only a minority earn above 10,000 yuan (7.52%), suggesting that the income level was moderate for most employees, and financial incentives might play a crucial role in the success of green HRM strategies.

Working experience data show that 44.86% of respondents have 4–6 years of experience, 34.34% have more than 6 years, and 20.80% have 1–3 years, highlighting that most employees were not novices but also not at the senior-most level, possibly indicating their roles as implementers rather than policy formulators. From a departmental perspective, the highest proportions come from administration (35.84%) and sales (32.58%), with human resources representing 14.54%, strategic planning 4.26%, and others 12.78%. This distribution ensures the inclusion of both core operational and strategic roles, which was essential for understanding the multidimensional impact of green HRM practices.

Geographically, the sample spans across multiple regions: 34.84% were from tier-one cities including Beijing, Shanghai, and Guangzhou; 49.88% from other provincial capitals; and 15.29% from lower-tier cities. This geographic spread offers a comprehensive view of regional diversity in management practices and organizational culture.

Regarding company size, the majority of respondents (59.15%) were from medium-sized companies (301–1000 employees), 26.57% from large companies (1001

or more), and 14.29% from small companies (300 or less), ensuring representation across different organizational scales. In terms of total company income in 2024, 59.90% of respondents work in organizations with annual income above 100,000, 33.58% in the 10,001–100,000 range, and only 6.52% in companies earning below 10,000. This indicates that most respondents come from economically robust enterprises, which were more likely to have the resources and strategic capacity to implement green innovations and sustainability initiatives.

Overall, the diversity in demographic and organizational characteristics strengthens the generalizability and depth of the research, providing a solid foundation for analyzing the impact of green human resource management (GHRM), green innovation (GI), organizational citizenship behavior (OCB), and corporate environmental performance (CEP) in China's telecom sector.

Table 4.1 Demographic Characteristics of Sample

Variable	Options	Frequency	Percent (%)
Gender	Male	204	51.128
	Female	195	48.872
Age	18-30	14	3.509
	31-40	194	48.622
	41-50	139	34.837
	Above	52	13.033
Marital Status	Single	14	3.509
	Married	265	66.416
	Divorced	114	28.571
	Separated	6	1.504
Education	Under Bachelor	183	45.865
	Bachelor or Even	131	32.832
	Postgraduate or Up	85	21.303
Monthly Income	Below 5,000	166	41.604
	5,001-10,000	203	50.877
	10,001-20,000	18	4.511
	Above 20,001	12	3.008

Variable	Options	Frequency	Percent (%)
Working Experience	1- 3 Years	83	20.802
	4 -6 Years	179	44.862
	6 Years or More	137	34.336
Department	Strategic Planning	17	4.261
	Administration	143	35.840
	Human Resources	58	14.536
	Sales	130	32.581
	Others	51	12.782
Province	Beijing/Shanghai/Guangzhou	139	34.837
	All Provincial Capital Cities Other Than Beijing/Shanghai/Guangzhou.	199	49.875
	Other Cities Except the Above-Mentioned Ones	61	15.288
Number of Employees in the Company	300 or Less	57	14.286
	301- 1000	236	59.148
	1001 or More	106	26.566
Company Total Income In 2024	10,000 or Less	26	6.516
	10,001- 100,000	134	33.584
	100,001 or More	239	59.900
Total		399	100.0

Source: Researcher, 2025

4.2 Normality Test of Data Distribution

Table 4.2 presents the descriptive statistics for the four key dimensions examined in this study: green human resource management (GHRM), green innovation (GI), organizational citizenship behavior (OCB), and corporate environmental performance (CEP). Each dimension is based on responses from 399 participants. The mean values for all four variables are above the mid-point of the Likert scale (which typically centers at 3.00), indicating a generally positive perception among employees toward green management practices and environmental outcomes in their organizations.

Specifically, corporate environmental performance (mean = 3.795) receives the

highest average score, suggesting that most participants perceive their companies as performing relatively well in environmental aspects. Green innovation follows closely with a mean of 3.687, indicating a favorable view of the firm's efforts in environmentally oriented innovation activities. Similarly, green human resource management and organizational citizenship behaviour showed mean scores of 3.644 and 3.647, respectively, suggesting that employees recognize moderately strong practices in HRM and voluntary green behavior.

The standard deviations range from 0.805 to 0.938, indicating a moderate level of variation in responses, with the highest variability found in OCB. Skewness values are all negative (ranging from -0.261 to -0.404), indicating a slight left-skew in the data, meaning that more respondents tend to give higher scores across all four dimensions. Kurtosis values are all negative as well (ranging from -0.882 to -1.135), suggesting relatively flatter distributions compared to a normal curve, which implies that responses were spread out rather than concentrated around the mean.

Table 4.2 Percentage Distribution of Each Dimension

Dimension	N	Mean	Std. Deviation	Skewness	Kurtosis
Green Human Resource Management	399	3.644	0.905	-0.404	-0.882
Green Innovation	399	3.687	0.896	-0.402	-0.975
Organizational Citizenship Behaviour	399	3.647	0.938	-0.293	-1.135
Corporate Environmental Performance	399	3.795	0.805	-0.261	-1.024

Source: Researcher, 2025

4.3 Discriminatory Power, Reliability Analysis and Validity Analysis

The research questionnaire garnered 399 valid responses. Reliability and validity tests were performed on the questionnaire data. Upon passing these tests, structural equation modeling analysis was carried out.

4.3.1 Reliability Analysis

Reliability analysis was essential to ensure the validity of model fit evaluation and hypothesis testing. This study employed Cronbach's Alpha coefficient to examine the degree of consistency among the measurement items of the research variables in the questionnaire. Cronbach's Alpha coefficient must exceed 0.7. Cronbach's Alpha was a commonly used metric for measuring reliability. In this study, Cronbach's Alpha was utilized to analyze the internal consistency of the relevant options in the questionnaire, namely, for reliability analysis. Cronbach's Alpha typically ranges from 0 to 1. A coefficient between 0.5 and 0.7 indicates moderate reliability, while a coefficient above 0.7 signifies strong reliability of the indicators.

Table 4.3 presents the results of the reliability analysis using Cronbach's Alpha for the four key dimensions: green human resource management (GHRM), green innovation (GI), organizational citizenship behavior (OCB), and corporate environmental performance (CEP). All dimensions exhibit high internal consistency reliability, as indicated by Cronbach's Alpha values well above the commonly accepted threshold of 0.70.

Among the four constructs, corporate environmental performance shows the highest reliability with a Cronbach's Alpha of 0.937 across 6 items, reflecting excellent consistency in participants' responses related to the organization's environmental outcomes and practices. green human resource management also demonstrates very strong reliability with a Cronbach's Alpha of 0.917 over 8 items, indicating that the scale effectively captures the practices and policies used to promote environmental responsibility through HR strategies.

Green innovation follows with a Cronbach's Alpha of 0.899 across 5 items, showing that the items related to innovation initiatives with environmental benefits were consistently understood and rated by respondents. organizational citizenship behavior, with a Cronbach's Alpha of 0.870 for 10 items, also meets the high reliability standard, supporting the robustness of the scale in measuring employees' voluntary and environmentally supportive behaviors beyond their formal job requirements.

In conclusion, the high reliability coefficients across all four dimensions confirm that the measurement instruments used in this study were statistically sound and reliable for further analysis such as regression, path modeling, or structural equation modeling.

Table 4.3 Reliability Analysis

Dimension	Cronbach's Alpha	Items
Green Human Resource Management	0.917	8
Green Innovation	0.899	5
Organizational Citizenship Behavior	0.870	10
Corporate Environmental Performance	0.937	6

Source: Researcher, 2025

4.3.2 Validity Analysis

The data presents the model fit indices and their observed values from Confirmatory Factor Analysis (CFA), aiming to evaluate the adequacy and validity of the research model. The latent variables measured through CFA were effectively reflected by the observed variables. The Model Fit Indicators in the table encompass several commonly used goodness-of-fit test parameters. By comparing the observed values of these indices with the recognized threshold ranges, one can determine whether the model's adequacy meets statistical requirements.

Factor loadings were assessed for statistical significance with values exceeding 0.7. Composite reliability (CR) denotes the internal consistency of the items within a construct, with higher reliability indicating greater consistency among these items, necessitating a value above 0.7. Average Variance Extracted (AVE) calculates the explanatory power of each measurement item of a latent variable on the variable's variance. A higher AVE value signifies greater reliability and convergent validity of the items, with a recommended standard value exceeding 0.5.

Table 4.4 presents the results of the Confirmatory Factor Analysis (CFA) model fit for the four dimensions with a sample size of 399. The model fit indicators demonstrate that the measurement model exhibits an excellent fit to the data. The CMIN/DF value was 1.601, which was well below the acceptable threshold of 5, and

even under the ideal value of 3, indicating a good model parsimony. The Goodness-of-Fit Index (GFI) was 0.908, and the Adjusted Goodness-of-Fit Index (AGFI) was 0.892, both falling within the acceptable range, with GFI surpassing the 0.90 benchmark. The Root Mean Square Error of Approximation (RMSEA) was 0.039, far below the threshold of 0.08, suggesting an excellent fit with low error.

Additionally, other incremental fit indices such as Incremental Fit Index (IFI = 0.969), Normed Fit Index (NFI = 0.923), Tucker-Lewis Index (TLI = 0.966), and Comparative Fit Index (CFI = 0.969) all exceed the recommended threshold of 0.90, indicating strong model performance. The CFA results confirm that the factor structure of the model was valid and statistically sound, supporting the construct validity of the four dimensions used in this study.

Table 4.4 Confirmatory Factor Analysis Model Fit Intercept (N=399）

Model Fit Indicators	Threshold Range	Observed Values
CMIN		593.888
DF		371
CMIN/DF	Below 5, best below 3	1.601
GFI	Above 0.9，0.8-0.9Acceptable	0.908
AGFI	Above 0.9，0.8-0.9Acceptable	0.892
RMSEA	Below 0.08	0.039
IFI	Above 0.9，0.8-0.9Acceptable	0.969
NFI	Above 0.9，0.8-0.9Acceptable	0.923
TLI(NNFI)	Above 0.9，0.8-0.9Acceptable	0.966
CFI	Above 0.9，0.8-0.9Acceptable	0.969

Source: Researcher, 2025

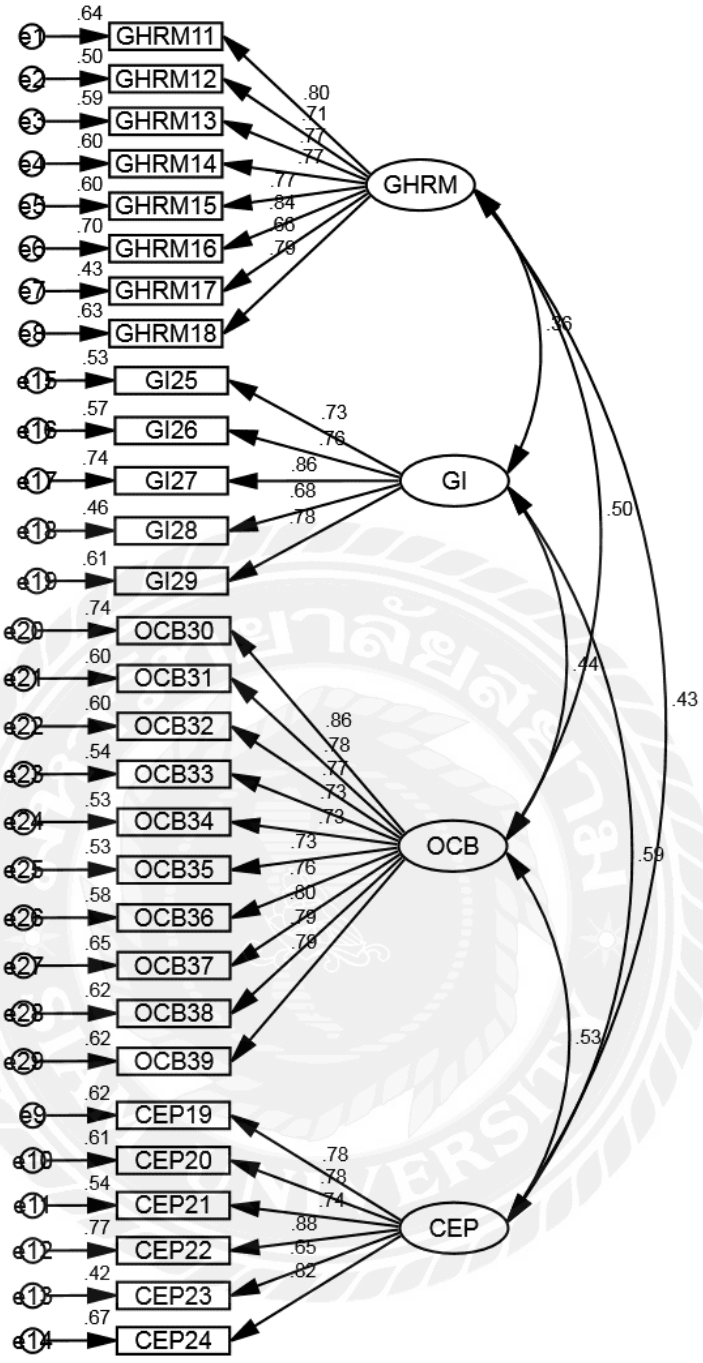

Figure 4.1 Confirmatory Factor Analysis

Source: Researcher, 2025

The results of factor loadings, Average Variance Extracted (AVE), and Composite Reliability (CR) values in the Confirmatory Factor Analysis (CFA) of this study are presented. The estimated values (Estimate), standard errors (S.E.), critical ratios (C.R.), P-values, factor loadings (Factor Loading), composite reliability (CR), and average variance extracted (AVE) for each dimension derived from Confirmatory Factor Analysis (CFA) are outlined. The data indicate that the critical ratios (C.R.) for

all path relationships exceed 1.96, with all P-values being significant (***), suggesting that each path relationship had passed the statistical significance test and possesses high credibility.

Regarding factor loadings across various dimensions, most scales exhibit relatively high factor loadings, with the majority surpassing 0.7, indicating that these scales effectively reflect their corresponding constructs. The factor loadings for dimensions were above 0.7, further validating their internal consistency and measurement validity. The Composite Reliability (CR) and Average Variance Extracted (AVE) for each dimension are presented. The CR values for all dimensions exceed 0.7, suggesting good measurement reliability for each construct. The AVE values were generally high, demonstrating strong convergent validity across dimensions and the ability to capture the multidimensional characteristics of the corresponding constructs. Confirmatory Factor Analysis provides statistical support for each measurement dimension, confirming the reliability and validity of the scales and laying a solid foundation for further structural equation modeling analysis.

Table 4.5 shows that all latent variables in the model, GHRM, CEP, GI, and OCB exhibit good convergent validity, as their Composite Reliability (CR) values all exceed 0.87 and their Average Variance Extracted (AVE) values were above the recommended threshold of 0.50. Specifically, GHRM had a CR of 0.918 and an AVE of 0.586, CEP had a CR of 0.900 and an AVE of 0.602, GI had a CR of 0.874 and an AVE of 0.583, and OCB shows the strongest reliability with a CR of 0.938 and an AVE of 0.601. All factor loadings were statistically significant and generally exceed 0.70, further confirming the reliability and consistency of the measurement model.

Table 4.5 AVE and CR of Confirmatory Factor Analysis

Path Relationship			Estimate	S.E.	C.R.	P	Factor Loading	CR	AVE
GHRM1	<---	GHRM	1.000				0.802	0.918	0.586
GHRM2	<---	GHRM	0.821	0.054	15.319	***	0.710		
GHRM3	<---	GHRM	1.017	0.060	16.869	***	0.767		
GHRM4	<---	GHRM	0.935	0.055	17.048	***	0.772		
GHRM5	<---	GHRM	0.828	0.048	17.177	***	0.774		
GHRM6	<---	GHRM	0.925	0.049	18.856	***	0.838		
GHRM7	<---	GHRM	0.781	0.056	13.929	***	0.655		

Path Relationship			Estimate	S.E.	C.R.	P	Factor Loading	CR	AVE
GHRM8	<---	GHRM	1.021	0.058	17.523	***	0.791		
CEP1	<---	CEP	1.000				0.785	0.900	0.602
CEP2	<---	CEP	0.855	0.051	16.776	***	0.779		
CEP3	<---	CEP	0.806	0.052	15.593	***	0.737		
CEP4	<---	CEP	1.002	0.052	19.229	***	0.875		
CEP5	<---	CEP	0.650	0.049	13.299	***	0.645		
CEP6	<---	CEP	1.021	0.059	17.291	***	0.816		
GI1	<---	GI	1.000				0.729	0.874	0.583
GI2	<---	GI	1.314	0.091	14.398	***	0.758		
GI3	<---	GI	1.367	0.085	16.046	***	0.860		
GI4	<---	GI	1.183	0.091	13.025	***	0.676		
GI5	<---	GI	1.319	0.089	14.747	***	0.781		
OCB6	<---	OCB	1.000				0.863	0.938	0.601
OCB7	<---	OCB	0.875	0.046	19.046	***	0.775		
OCB8	<---	OCB	0.775	0.041	18.892	***	0.772		
OCB9	<---	OCB	0.843	0.048	17.438	***	0.733		
OCB10	<---	OCB	0.711	0.041	17.260	***	0.726		
OCB11	<---	OCB	0.703	0.040	17.481	***	0.731		
OCB12	<---	OCB	0.870	0.047	18.651	***	0.763		
OCB13	<---	OCB	0.962	0.047	20.252	***	0.804		
OCB14	<---	OCB	0.890	0.046	19.380	***	0.788		
OCB15	<---	OCB	0.806	0.040	19.952	***	0.790		

Source: Researcher, 2025

4.4 Correlation Analysis

Table 4.6 presents the results of Pearson's correlation analysis of the four key dimensions. All correlations were statistically significant at the $p < 0.001$ level, indicating meaningful positive relationships between variables. green human resource management (GHRM) is positively correlated with organizational citizenship behavior (OCB) ($r = 0.470$), green innovation (GI) ($r = 0.325$), and corporate environmental performance (CEP) ($r = 0.403$). OCB also shows strong positive correlations with GI ($r = 0.407$) and CEP ($r = 0.486$). Additionally, GI is positively correlated with CEP ($r = 0.538$), suggesting that higher levels of green innovation are associated with better corporate environmental outcomes. The square roots of the AVE values (on the diagonal) are all greater than the corresponding inter-construct correlations, supporting the discriminant validity of the measurement model.

Table 4.6 Results of Pearson's Correlation Analysis for Each Dimension

	Mean	SD	AVE	GHRM	OCB	GI	CEP
GHRM	3.644	0.905	0.766	0.766			
OCB	3.647	0.938	0.775	0.470***	0.775		
GI	3.687	0.896	0.764	0.325***	0.407***	0.764	
CEP	3.795	0.805	0.776	0.403***	0.486***	0.538***	0.776

NOTE: * p<0.05 ** p<0.01 *** p<0.001

Source: Researcher, 2025

4.5 Structural Equation Models and Hypothesis Testing

This study employed AMOS to conduct model fit analysis on statistical data from SPSS, aiming to assess the degree of model fit. It was acknowledged that a chi-square degree-of-freedom ratio (CMIN/DF) less than 3 indicates a high degree of fit between the model and the data; a Root Mean Square Error of Approximation (RMSEA) value less than 0.08 suggests a good fit, with values less than 0.05 being even more favorable. Fit indices can be judged through the Comparative Fit Index (CFI). The data values of these fit indices range from 0 to 1, and it is considered that values greater than 0.8 indicate a good fit, with values greater than 0.9 being preferable, and values closer to 1 being ideal. The specific criteria for evaluating fit indices are presented in Table 4.7.

Table 4.7 Fit Indicator Test Criteria

Indicator Name	Range of Values	Judgment Criteria
CMIN/DF	>0	Best: ≤ 2.00 Good: ≤ 3.00 Acceptable: ≤ 5.00
Root Mean Square Error of Approximation (RMSEA)	>0	Maximum:0.00 Good: ≤ 0.05 Acceptable: ≤ 0.08
The Bentler-Bonett's Normed Fit Index (NFI)	0-1	Maximum: =1.00 Best: > 0.98 Good: > 0.90 Acceptable: > 0.80
Incremental Fit Index (IFI)	0-1	> Maximum: =1.00 Best: > 0.97 Better: > 0.95 Good: ≥ 0.90 Acceptable: > 0.80
Tucker-Lewis Index (TLI)	0-1	Maximum: =1.00 Best: > 0.97 Better: > 0.95 Good: ≥ 0.90 Acceptable: > 0.80
Comparative Fit Index of Bentler (CFI)	0-1	Maximum: =1.00 Best: > 0.97 Better: > 0.95 Good: ≥ 0.90 Acceptable: > 0.80

Source: Researcher, 2025

After establishing the structural equation model, the software's model path

significance test was conducted, yielding the standardized path coefficients, critical ratio (C.R.), and significance P-values of the influencing factors. The C.R. exceeded 1.96, and the P-value was less than 0.05. This path coefficient passed the significance test within a 95% confidence interval, indicating that the corresponding path hypothesis of the model was valid.

Table 4.8 presents the model fit indices for the structural equation model based on a sample of 339 participants. The results demonstrate a good overall model fit. Specifically, the chi-square to degrees of freedom ratio (CMIN/DF) was 1.601, which fall well below the threshold of 3, indicating a good fit between the model and the observed data. The goodness-of-fit index (GFI) is 0.908 and the adjusted goodness-of-fit index (AGFI) was 0.892, both within the acceptable range. The root mean square error of approximation (RMSEA) is 0.039, well below the recommended maximum of 0.08, signifying a close fit. Additionally, other comparative indices such as the incremental fit index (IFI = 0.969), normed fit index (NFI = 0.923), Tucker-Lewis index (TLI = 0.966), and comparative fit index (CFI = 0.969) all exceed the 0.90 benchmark, further confirming the robustness and adequacy of the model's fit to the data.

Table 4.8 Model Fit Intercept (N=339）

Model Fit Indicators	Threshold Range	Observed Values
CMIN		593.888
DF		371
CMIN/DF	Below 5, best below 3	1.601
GFI	Above 0.9，0.8-0.9Acceptable	0.908
AGFI	Above 0.9，0.8-0.9Acceptable	0.892
RMSEA	Below 0.08	0.039
IFI	Above 0.9，0.8-0.9Acceptable	0.969
NFI	Above 0.9，0.8-0.9Acceptable	0.923
TLI(NNFI)	Above 0.9，0.8-0.9Acceptable	0.966
CFI	Above 0.9，0.8-0.9Acceptable	0.969

Source: Researcher, 2025

4.5.1 Verification of Direct Effects

Table 4.9 presents the results of the structural equation modeling, confirming the hypothesized relationships among the four core constructs: green human resource management (GHRM), organizational citizenship behavior (OCB), green innovation (GI), and corporate environmental performance (CEP). The path from GHRM to OCB was significant with a standardized estimate of 0.500 ($p < 0.001$), indicating that

effective implementation of GHRM practiced positively influences employees' voluntary and cooperative behaviors. Additionally, GHRM had a direct and significant effect on GI (standardized estimate = 0.187, p = 0.002), suggesting that green HR initiatives promoted innovative environmental practices. GHRM also exerts a significant but modest direct effect on CEP (standardized estimate = 0.143, p = 0.006), highlighting the role of human resource strategies in shaping environmental outcomes. Meanwhile, OCB significantly predicts GI (standardized estimate = 0.348, p < 0.001), underscoring the mediating role of employee citizenship in fostering innovation. OCB also contributes positively to CEP (standardized estimate = 0.268, p < 0.001), indicating that employees who go beyond their formal duties can help organizations enhance their environmental performance. Finally, GI has the strongest direct effect on CEP (standardized estimate = 0.423, p < 0.001), suggesting that innovative green practices were critical drivers of improved corporate environmental results. Overall, these findings validate a sequential and mediating mechanism through which GHRM improves CEP via OCB and GI.

Table 4.9 Results of Structural Equation Modeling

Path Relationship			Estimate	S.E.	C.R.	P	Standardized Estimate
OCB	<---	GHRM	0.569	0.060	9.491	***	0.500
GI	<---	GHRM	0.134	0.043	3.107	0.002	0.187
GI	<---	OCB	0.219	0.039	5.605	***	0.348
CEP	<---	GHRM	0.130	0.047	2.733	0.006	0.143
CEP	<---	OCB	0.214	0.044	4.870	***	0.268
CEP	<---	GI	0.538	0.072	7.421	***	0.423

NOTE: * p<0.05 ** p<0.01 *** p<0.001

Source: Researcher, 2025

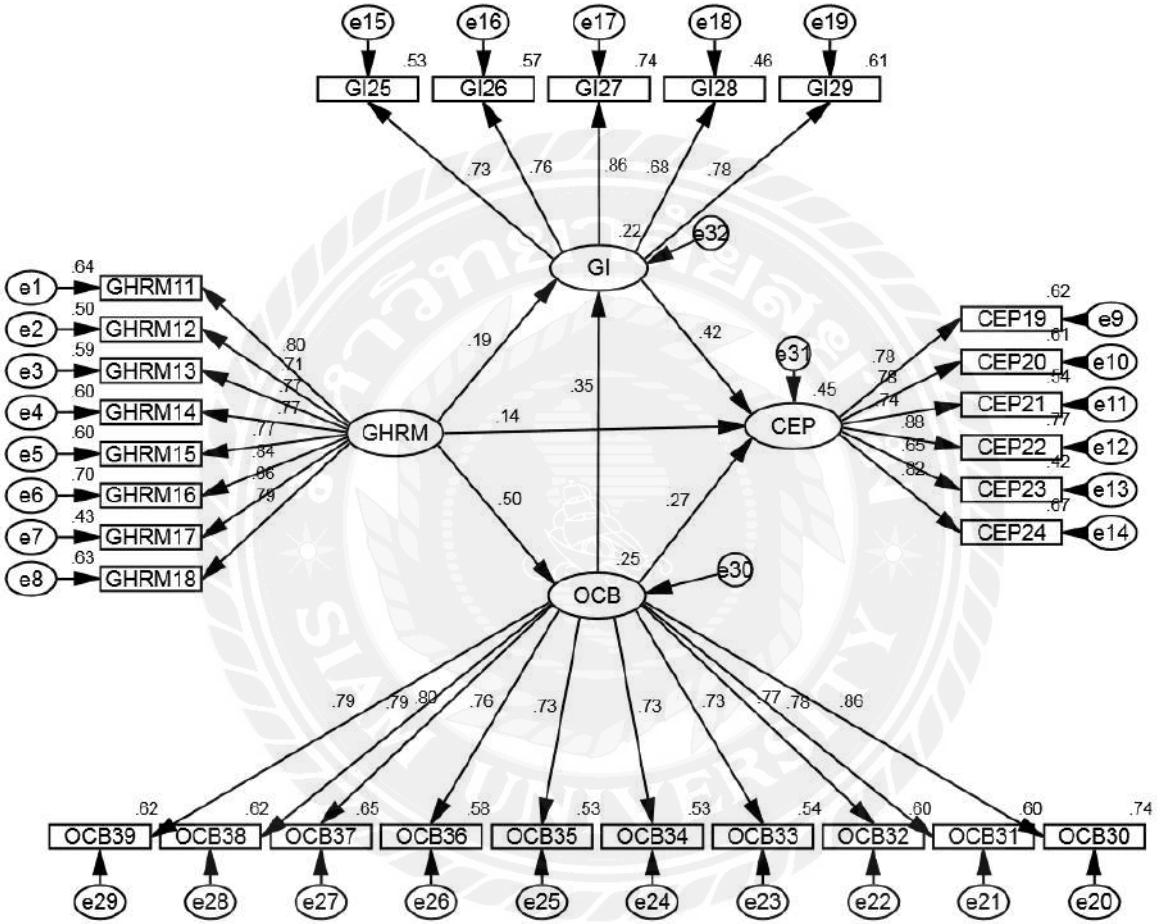

Figure 4.2 The Modified Structural Equation Model

Source: Researcher, 2025

4.5.2 Mediation Effect Verification

To verify the mediation effects within the model, the Bootstrap mediation effect test was employed to examine the significance of these effects, following the Bootstrap method proposed by Hayes (2013) for testing moderated mediation effects. With a sample size of 399 and under a 95% confidence interval, the process involved 5000 resampling iterations to assess the mediation effect results.

Table 4.10 summarizes the bootstrap test results for the direct and indirect effects of green human resource management (GHRM) on corporate environmental performance (CEP), highlighting the mediation roles of organizational citizenship behavior (OCB) and green innovation (GI). The direct effect of GHRM on CEP is significant, with an estimate of 0.143 ($p = 0.007$), accounting for 33.2% of the total effect. The indirect effects reveal that GHRM influences CEP through multiple pathways: via OCB alone (effect = 0.134, $p < 0.001$), contributing 31.2%; via GI alone (effect = 0.079, $p = 0.004$), accounting for 18.4%; and through a sequential mediation of OCB leading to GI, then to CEP (effect = 0.074, $p < 0.001$), making up 17.2% of the total effect. Collectively, these indirect effects sum to 0.287, which was 66.8% of the total effect of GHRM on CEP, underscoring the importance of these mediating mechanisms. The total effect of GHRM on CEP is 0.429 ($p < 0.001$), demonstrating a strong overall influence. These results confirm that the impact of GHRM on environmental performance is largely transmitted through employees' citizenship behaviors and green innovation activities, highlighting the critical role of human and behavioral factors in achieving sustainable corporate outcomes.

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Table 4.10 Results of Bootstrap Indirect Effects Tests

Path Relationship	Effect	SE	Bias Corrected（95%）			Percentile method（95%）			%
			LLCI	ULCI	P	LLCI	ULCI	P	
GHRM⇒ CEP Direct Effect	0.143	0.053	0.039	0.245	0.008	0.040	0.246	0.007	33.2%
GHRM⇒ OCB⇒ CEP	0.134	0.032	0.078	0.202	0.000	0.076	0.198	0.000	31.2%
GHRM⇒ GI⇒ CEP	0.079	0.028	0.028	0.139	0.003	0.027	0.138	0.004	18.4%
GHRM⇒ OCB⇒ GI⇒ CEP	0.074	0.017	0.045	0.114	0.000	0.043	0.109	0.000	17.2%
GHRM⇒ CEP Indirect Total Effect	0.287	0.039	0.216	0.368	0.000	0.213	0.364	0.000	66.8%
GHRM⇒ CEP Total Effect	0.429	0.046	0.337	0.516	0.000	0.338	0.518	0.000	

Table 4.11 Hypotheses Test Results

Hypothesis	Result
Hypothesis 1: Green human resource management has a positive impact on corporate environmental performance.	Supported
Hypothesis 2: Green human resource management has a positive impact on green innovation.	Supported
Hypothesis 3: Green innovation has a positive impact on corporate environmental performance.	Supported
Hypothesis 4: Green human resource management has a positive impact on organizational citizenship behavior.	Supported
Hypothesis 5: Organizational citizenship behavior has a positive impact on corporate environmental performance.	Supported
Hypothesis 6: Green innovation mediates the relationship between green human resource management and corporate environmental performance.	Supported
Hypothesis 7: Organizational citizenship behavior mediates the relationship between green human resource management and corporate environmental performance.	Supported
Hypothesis 8: Organizational citizenship behavior has a positive impact on green innovation.	Supported

4.6 Qualitative Data Analysis

4.6.1 Characteristics of Interview Participants

The characteristics of twelve interview participants are presented in Table 4.12.

Table4.12 Characteristics of Interview Participants

Participant ID	Job Position	Years of Experience	Job Title	Department Code
P01	Senior Manager, Human Resources	12 years	Senior Manager	HR-A01
P02	Training and Development Supervisor	9 years	Mid-level Supervisor	HR-B02
P03	Recruitment Manager	10 years	Manager	HR-C03
P04	Compensation and Performance Analyst	6 years	Specialist	HR-D04
P05	CSR Project Manager	11 years	Project Manager	CSR-E05
P06	Green Operations Supervisor	8 years	Supervisor	ENV-F06
P07	Deputy Manager, Network Technology	13 years	Deputy Manager	NET-G07
P08	Project Coordinator, Strategic Development	7 years	Coordinator	STR-H08
P09	Base Station Construction Project Manager	10 years	Project Manager	ENG-I09
P10	Corporate Culture and Employee Relations Officer	5 years	Officer	HR-J10
P11	HR Supervisor, Regional Marketing Department	9 years	Supervisor	MKT-K11
P12	Green Audit Officer, Equipment Procurement	6 years	Audit Specialist	PUR-L12

4.6.3 Content Analysis

Based on the coding analysis of the results from 12 interviewees using NVivo14, the results were organized and summarized across five dimensions: Selective Coding, Axial Coding, Open Coding, Reference Code Point, and Description, resulting in a systematic interview analysis table and an overview of the findings. The results are presented in Table 4.13.

Table 4.13 Interview Text Analysis Category System

Selective Coding	Axial Coding	Open Coding / Key Statements	Reference Code Point	Description
Green Human Resource Management (GHRM)	Recruitment and Selection	"Our recruitment emphasizes candidates' environmental awareness and commitment."	P01-Para1	Recruitment integrates green values to ensure employees support sustainability goals.
Green Human Resource Management (GHRM)	Recruitment and Selection	"We integrate environmental responsibility criteria into job descriptions and interview evaluations."	P03-Para1	Recruitment process promotes green commitment from hiring stage.
Green Human Resource Management (GHRM)	Recruitment and Selection	"Recruiting talent aligned with our green values was key."	P03-Para1	Hiring decisions set the foundation for green organizational culture.
Green Human Resource Management (GHRM)	Training and Development	"We run workshops on resource-efficient work practices and environmental compliance."	P02-Para1	Training programs enhance employees' environmental skills and awareness.
Green Human Resource Management (GHRM)	Training and Development	"Our training includes sustainability modules to instill eco-friendly values."	P01-Para1	Formal training embeds environmental values in workforce.
Green Human Resource Management (GHRM)	Training and Development	"Green HRM means actionable skills, not just awareness."	P02-Para1	Emphasizes practical application of green knowledge.
Green Human Resource Management (GHRM)	Performance Appraisal and Incentives	"We have incorporated green performance indicators into appraisals and incentives."	P01-Para1	Linking performance reviews to environmental outcomes motivates staff.
Green Human Resource Management (GHRM)	Performance Appraisal and Incentives	"We design incentives that reward eco-friendly behavior such as bonuses for reducing energy consumption."	P04-Para1	Financial rewards encourage sustainable practices.
Green Human	Performance	"Recognition awards and career	P04-Para2	Incentive schemes help sustain

Selective Coding	Axial Coding	Open Coding / Key Statements	Reference Code Point	Description
Resource Management (GHRM)	Appraisal and Incentives	advancement opportunities motivate employees."		organizational citizenship behavior.
Green Human Resource Management (GHRM)	Policy Implementation and Management	"HR managers play a crucial role in implementing green HRM practices."	P01-Para1	Middle managers were key executors of green policies.
Green Human Resource Management (GHRM)	Policy Implementation and Management	"Managers serve as operational bridges translating senior leadership strategies."	P01-Para1	Managers ensure green strategies reach frontline employees.
Green Human Resource Management (GHRM)	Policy Implementation and Management	"Our GHRM includes green recruitment, training, performance evaluation, and compensation systems."	P01-Para1	Comprehensive green HRM system designed for effectiveness.
Green Innovation (GI)	Idea Generation and Sharing	"We encourage idea-sharing platforms where employees propose energy-saving projects."	P01-Para2	Bottom-up green innovation fosters practical improvements.
Green Innovation (GI)	Idea Generation and Sharing	"Employee suggestions drive many green initiatives."	P01-Para2	Innovation often arises from frontline insights.
Green Innovation (GI)	Idea Generation and Sharing	"We maintain suggestion boxes and reward the best green ideas."	P06-Para2	Incentivizing innovation through feedback channels.
Green Innovation (GI)	Idea Generation and Sharing	"Green innovation was supported by cross-department collaboration."	P01-Para2	Interdepartmental teamwork enhances innovation impact.
Green Innovation (GI)	Technical Innovation	"Adopting energy-efficient devices and optimizing network operations."	P07-Para1	Technological upgrades reduce environmental footprint.
Green Innovation (GI)	Technical Innovation	"Introducing new equipment or processes reduces emissions and waste."	P06-Para1	Technical improvements form core of GI in operations.

Selective Coding	Axial Coding	Open Coding / Key Statements	Reference Code Point	Description
Green Innovation (GI)	Technical Innovation	“Eco-friendly materials and efficient construction techniques were applied.”	P09-Para1	GI in engineering involves sustainable materials and methods.
Green Innovation (GI)	Technical Innovation	“Green innovation was part of our strategic road map with pilot programs and external partnerships.”	P08-Para1	GI was planned strategically, not ad hoc.
Green Innovation (GI)	Process Innovation	“Streamlining recruitment processes reduces paper use and travel emissions.”	P03-Para1	Administrative innovation contributes to environmental goals.
Green Innovation (GI)	Process Innovation	“Procurement adopts new supplier evaluation criteria focused on sustainability.”	P12-Para1	Supplier selection reflects GI principles.
Organizational Citizenship Behavior (OCB)	Voluntary Green Actions	“Green teams initiate recycling and energy conservation drives.”	P02-Para2	Employee voluntary groups promote sustainability beyond formal roles.
Organizational Citizenship Behavior (OCB)	Voluntary Green Actions	“Employees voluntarily report inefficiencies and suggest improvements.”	P06-Para2	Proactive employee behavior supports green goals.
Organizational Citizenship Behavior (OCB)	Voluntary Green Actions	“Workers voluntarily adhere to environmental protocols and suggest improvements.”	P09-Para2	OCB extends to frontline operational levels.
Organizational Citizenship Behavior (OCB)	Organizational Culture and Engagement	“Employees feel valued for their green contributions, encouraged by recognition programs.”	P01-Para2	Recognition sustains OCB by fostering employee motivation.
Organizational Citizenship Behavior (OCB)	Organizational Culture and Engagement	“Cultivating a sense of ownership among staff through transparent communication.”	P08-Para2	Engagement strategies enhance OCB.
Organizational Citizenship Behavior	Organizational Culture and	“Embedding green values into corporate culture creates shared environmental	P10-Para1	Culture shapes employee green behaviors.

Selective Coding	Axial Coding	Open Coding / Key Statements	Reference Code Point	Description
(OCB)	Engagement	norms.”		
Organizational Citizenship Behavior (OCB)	Incentives and Rewards	“Recognition awards and career advancement opportunities motivate employees to engage in OCB.”	P04-Para2	Incentives reinforce green citizenship behaviors.
Organizational Citizenship Behavior (OCB)	Incentives and Rewards	“Peer recognition systems publicly acknowledge employees championing sustainability.”	P03-Para1	Peer influence promotes green behavior.
Corporate Environmental Performance (CEP)	Environmental Outcomes and Metrics	“Environmental performance had steadily improved due to integrated GHRM and GI efforts.”	P01-Para3	Positive environmental trends linked to comprehensive green strategies.
Corporate Environmental Performance (CEP)	Environmental Outcomes and Metrics	“Corporate environmental metrics show positive trends, partly credited to OCB.”	P02-Para2	Employee green behaviors measurably improve CEP.
Corporate Environmental Performance (CEP)	Environmental Outcomes and Metrics	“Environmental KPIs have improved, but challenges exist in measuring individual contributions accurately.”	P04-Para2	Performance measurement complexity remains a barrier.
Corporate Environmental Performance (CEP)	Challenges and Constraints	“Short-term business pressures conflict with long-term sustainability goals.”	P01-Para3	Balancing profit and green goal difficult.
Corporate Environmental Performance (CEP)	Challenges and Constraints	“More cross-department support would accelerate environmental progress.”	P06-Para2	Collaboration was essential for environmental success.
Corporate Environmental Performance (CEP)	Challenges and Constraints	“Faster technology upgrades and increased R&D investment were needed to improve performance.”	P07-Para1	Innovation investment critical for environmental advancement.
Corporate Environmental	Strategic Alignment and	“Environmental performance benefits from strategic alignment but requires stronger	P08-Para2	Clear metrics and strategy integration boost CEP.

Selective Coding	Axial Coding	Open Coding / Key Statements	Reference Code Point	Description
Performance (CEP)	Reporting	progress tracking."		
Corporate Environmental Performance (CEP)	Strategic Alignment and Reporting	"Sustaining environmental performance relies on continuous cultural reinforcement and employee engagement."	P10-Para1	Culture and engagement were long-term success factors.

Source: The Researcher, 2024

4.6.3 Analysis of Interview Results

1. Green human resource management (GHRM)

The findings of this study highlight green human resource management (GHRM) as a comprehensive, integrated system that spans the entire employee lifecycle, from recruitment through to training, performance appraisal, and reward mechanisms, all of which were designed to enhance employees' environmental awareness and green behaviors.

Recruitment & Selection

A key aspect of GHRM identified by interviewees was the importance of embedding green values from the recruitment stage. This goes beyond simply recruiting environmentally aware individuals; the emphasis was on attracting candidates who possess both environmental consciousness and the capacity to contribute to sustainability goals within the organization. As one participant noted:

"Our recruitment emphasizes candidates' environmental awareness and commitment" (P01).

This indicates that companies were increasingly seeking individuals who not only have the technical skills but also the personal values aligned with the company's green objectives. Furthermore, eco-focused recruitment strategies include tailored messaging to attract candidates with an intrinsic motivation for sustainability, signaling that the company prioritizes green practices as a core value.

Training & Development

Training programs were found to be crucial in embedding green principles across the organization. Interviewees pointed out that sustainability modules were integrated into the core training curriculum to ensure employees continuously develop their environmental competence. The emphasis was on practical applications of sustainability that employees can implement in their daily tasks:

"We run workshops on resource-efficient work practices and environmental compliance" (P02).

Such programs often involve hands-on activities and workshops on topics such as resource conservation, waste management, and eco-friendly office behaviors. This not only equips employees with the knowledge but also ensures that green practices become ingrained in their work culture. In some companies, green leadership development programs were implemented, focusing on nurturing sustainability champions who can drive innovation and influence their peers towards greener practices.

Performance Appraisal & Incentive Mechanisms

Performance appraisals were found to be directly aligned with environmental goals. Green performance indicators were now embedded in performance reviews, signaling the importance of sustainability as a critical factor in assessing overall employee performance:

“We have incorporated green performance indicators into appraisals and incentives” (P01).

These indicators were designed to assess employees’ participation in green initiatives such as energy savings, waste reduction, and involvement in green innovation projects. By integrating these metrics into the performance appraisal system, companies ensure that sustainability was viewed as a key area of professional responsibility.

Incentive systems were found to offer both monetary and non-monetary rewards to employees who actively contribute to environmental goals. As noted by one interviewee:

“Incentives include bonuses, career progression, and recognition at company events for those who show outstanding commitment to environmental practices” (P04).

By offering these rewards, companies foster employee motivation to engage with environmental goals, thereby creating a positive feedback loop that encourages further participation in green initiatives. Additionally, green performance bonuses and promotion opportunities linked to environmental contributions help maintain a strong organizational focus on sustainability.

Role of Human Resource Managers

A consistent theme across interviews was the critical role of HR managers in translating organizational green strategies into concrete, actionable practices. HR managers were the key intermediaries between senior leadership and employees, ensuring that green policies were effectively communicated and implemented at the operational level:

“HR managers play a crucial role in implementing green HRM practices” (P01).

This reflects the strategic importance of HR in driving the green agenda forward. HR managers not only ensure that environmental goals were aligned with organizational objectives, but they also act as change agents within the company, encouraging employees to adopt green practices and integrate them into their day-to-day work. As facilitators of this process, HR professionals also work closely with other departments to ensure cross-functional collaboration on sustainability initiatives.

Systemic Approach to Employee Engagement

The study further highlights that GHRM was not merely about “green policies” or

“sustainability programs,” but was a systemic approach that permeates every aspect of the employee experience. The integration of green values into recruitment, training, performance management, and rewards ensures that sustainability becomes a core part of the organizational culture. This holistic approach effectively motivates employees to participate actively in the organization’s green initiatives. As one interviewee mentioned:

“HR’s role goes beyond hiring – it’s about creating a culture of sustainability, where everyone was engaged in environmental practices” (P03).

This embedded approach ensures that green practices were not superficial or disconnected from daily operations but were instead interwoven with all aspects of employees’ professional journeys. By doing so, companies not only enhance their environmental performance but also create an internal culture of green innovation and organizational citizenship behavior.

The findings of this study underscore that green human resource management (GHRM) was a dynamic and integrated system that serves as the foundation for building a sustainable organizational culture in Chinese telecommunications companies. By embedding green values at every stage of the employee lifecycle—recruitment, training, performance management, and rewards—GHRM fosters an environment where employees were not only environmentally aware but actively engaged in green innovation and organizational citizenship behavior. As a result, companies were better positioned to achieve corporate environmental performance (CEP) while simultaneously enhancing employee motivation and commitment to sustainability. This approach reflects a growing recognition that the success of green strategies relies heavily on the engagement of employees, with HR managers acting as key enablers of this process.

2. Green innovation (GI)

Green innovation (GI) emerged as a vital driver of improved corporate environmental performance, encompassing both technological innovations and managerial practices. The study found that green innovation was not just about implementing new technologies but also about embedding a culture of sustainability throughout the organization, particularly through grassroots involvement and collaborative approaches.

Technological Innovation

One of the key themes that emerged from the interviews was the adoption of energy-efficient technologies and eco-friendly materials to reduce the environmental impact of operations. Companies were actively investing in technologies that allow them to cut energy consumption, reduce carbon emissions, and minimize their ecological footprint.

Energy-efficient devices: A common example of this was the use of energy-efficient equipment in network operations, such as low-energy servers, smart devices, and energy-saving telecom infrastructure. This not only reduces the company's carbon footprint but also leads to cost savings in energy consumption, making it a win-win solution for both the company and the environment.

"Adopting energy-efficient devices and optimizing network operations" (P07).

Eco-friendly materials: Another technological advancement involved the use of sustainable materials in the construction and maintenance of telecom networks and facilities. By using green materials, such as recycled components or biodegradable products, companies ensure that their infrastructure was not only long-lasting but also environmentally responsible.

"Eco-friendly materials and efficient construction techniques were applied" (P09).

This technological shift also supports resource conservation, as green technologies often reduce material waste and optimize energy use, which can have a significant impact on reducing overall emissions and waste generation.

Managerial and Process Innovation

In addition to technological innovations, managerial and process innovations were also critical in enhancing corporate environmental performance. These innovations included administrative improvements in operations, organizational culture, and supply chain management, all of which played an integral role in fostering a sustainable corporate environment.

Streamlining administrative processes: A major aspect of green innovation in the study was the streamlining of recruitment and administrative processes to reduce paper usage and minimize emissions from business travel. By implementing digital recruitment processes and utilizing electronic document management systems, companies reduce their reliance on paper, thus minimizing waste and the associated carbon emissions from printing and paper production. Additionally, video conferencing technologies have replaced travel for many internal meetings, reducing carbon emissions from employee travel.

"Streamlining recruitment processes reduces paper use and travel emissions" (P03).

Sustainable supplier selection: Another critical innovation was the adoption of sustainable procurement practices. In the procurement process, companies were shifting from traditional supplier selection criteria to a more green-focused evaluation framework. By prioritizing sustainability in the supplier selection process, companies ensure that their partners share similar environmental goals and practices. This can include evaluating suppliers based

on their environmental certifications, energy consumption, waste management practices, and adherence to green manufacturing standards.

“Procurement adopts new supplier evaluation criteria focused on sustainability” (P12).

This shift towards sustainable procurement practices ensures that the entire supply chain was aligned with the company’s environmental objectives, thus amplifying the impact of green initiatives throughout the organization and its external partners.

Grassroots Involvement and Cross-Departmental Collaboration

A standout theme throughout the interviews was the emphasis on grassroots involvement and cross-departmental collaboration as key enablers of green innovation. It became clear that green innovation does not only emanate from top-level management or the R&D department but also from employees at the ground level, who bring their own experiences and insights into the process.

Grassroots idea-sharing platforms: Participants highlighted that fostering an innovative environment was critical, and this was achieved through idea-sharing platforms where employees can propose energy-saving projects or eco-friendly initiatives. These platforms encourage employees to take ownership of green initiatives and empower them to contribute actively to the company’s sustainability goals.

“We encourage idea-sharing platforms where employees propose energy-saving projects” (P01).

By providing employees with the freedom to express their ideas and solutions, companies tap into a wealth of creativity and problem-solving capabilities that can lead to valuable, grassroots-driven innovations. Such initiatives promote a culture of collaboration, where employees across departments work together to develop and implement green solutions, whether it be in network operations, product design, or office practices.

Cross-department collaboration: Another vital component of green innovation in this study was the collaborative nature of green initiatives across various departments. Successful green projects often involve multiple stakeholders, such as HR, R&D, procurement, and operations. Collaboration between these departments ensures that environmental considerations were integrated into every aspect of the company’s operations and innovation processes. This holistic approach leads to synergistic benefits where departments share knowledge and resources to achieve shared sustainability goals.

“ green innovation was supported by cross-department collaboration” (P01).

By encouraging cross-functional teams to work together, companies were able to

leverage expertise from multiple areas, thereby enhancing their ability to innovate in a way that was both technologically advanced and sustainably sound.

The Integrated Approach to Sustainability

These findings demonstrate that green innovation was not limited to technology alone but extends to organizational culture and management practices. By fostering a culture of collaboration, transparency, and continuous improvement, companies ensure that green innovation was a shared responsibility across all levels of the organization. Furthermore, by integrating green principles into managerial practices such as procurement, administrative processes, and employee engagement, companies ensure that sustainability was embedded in the fabric of the organization.

This integrated approach leads to a sustainable organizational culture where environmental performance was seen as a collective effort and where every employee, department, and function contributes towards the company's green objectives. By encouraging grassroots ideas, supporting cross-functional collaboration, and implementing green technologies and management practices, companies were better equipped to achieve corporate environmental performance while maintaining a competitive edge in a rapidly evolving market.

Green innovation (GI) was a multifaceted and essential component of corporate environmental performance, involving technological innovations, process innovations, and a shift in organizational culture and management practices. By combining grassroots involvement, cross-departmental collaboration, and sustainable practices, telecommunications companies can drive sustainable innovation that significantly improves their environmental performance. Through these efforts, companies not only contribute to environmental sustainability but also enhance their competitiveness, creating long-term value for both the company and the environment.

3. Organizational citizenship behavior (OCB)

Organizational citizenship behavior (OCB) plays a pivotal role in advancing corporate green initiatives, acting as a bridge between formal sustainability policies and the actual day-to-day actions of employees. OCB was characterized by voluntary, extra-role behaviors—those behaviors that go beyond formal job requirements—that support and enhance the organization's environmental goals. This behavior helps embed sustainability into everyday work practices, creating a culture where employees proactively engage with the company's environmental objectives.

Active Employee Participation in Green Initiatives

One of the key findings from the study was the strong link between employee

involvement and green initiatives. Participants emphasized that OCB often manifests in the form of voluntary, proactive behaviors, which drive sustainability efforts forward within the organization.

Green teams were commonly formed to lead and organize initiatives such as recycling and energy conservation projects. These teams were usually composed of employees who go above and beyond their formal duties to champion green causes.

“Green teams initiate recycling and energy conservation drives” (P02).

This suggests that employee-led initiatives were a central driver of green innovation, as these teams work towards achieving the company’s sustainability goals through concrete actions.

Reporting inefficiencies and suggesting improvements were additional examples of voluntary actions by employees. Such behaviors indicate that employees feel a sense of responsibility for the environmental impact of their workplace and were eager to contribute to improving operational efficiency in a sustainable manner.

“Employees voluntarily report inefficiencies and suggest improvements” (P06).

These discretionary behaviors were crucial for embedding sustainability into daily practices, especially in industries like telecommunications, where operational efficiency and resource conservation were critical.

Key Enablers of OCB: Recognition and Rewards

The study revealed several factors that enable and encourage OCB in relation to green initiatives. One of the primary drivers of OCB was the organizational recognition and reward systems that acknowledge employees’ extra-role contributions to environmental sustainability.

Recognition programs serve as key motivators, providing employees with public acknowledgment of their efforts. This not only makes employees feel valued for their contributions but also reinforces the importance of green behaviors.

“Employees feel valued for their green contributions, encouraged by recognition programs” (P01).

Such programs can include awards for outstanding environmental performance, company-wide recognition events, and even certificates of appreciation for those who contribute significantly to sustainability efforts.

Career advancement opportunities were another crucial incentive. Employees who actively engage in green initiatives and OCB often find that their commitment to sustainability was recognized in the form of promotion opportunities and career progression. This creates a

clear link between green performance and career success, motivating employees to go beyond their prescribed duties to make a positive environmental impact.

“Recognition awards and career advancement opportunities motivate employees to engage in OCB” (P04).

By linking sustainability efforts to formal rewards, companies can create a virtuous cycle in which employees were continually motivated to contribute to the company’s environmental objectives.

Cultivating a Green Organizational Culture

Beyond formal recognition and rewards, the study also highlighted the importance of cultivating a green organizational culture. When green values were deeply embedded into the corporate culture, employees were more likely to adopt sustainable behaviors as part of their professional identity.

Embedding green values into the company’s corporate culture creates a sense of shared environmental responsibility across all levels of the organization. This shared culture fosters environmentally conscious behavior, as employees adopt the organization’ s values and norms related to sustainability.

“Embedding green values into corporate culture creates shared environmental norms” (P10).

Such cultural alignment ensures that sustainability was not seen as an isolated goal but as an integral part of the company’s mission. It encourages employees to feel that their contribution to the organization’s environmental performance was part of a larger societal effort.

Transparent communication was another important factor in cultivating a green culture. When companies openly communicate their sustainability goals and achievements, employees feel more connected to the company’s environmental vision and objectives. Furthermore, transparent communication helps to engage employees by ensuring that they feel informed and empowered to participate in green initiatives.

“Cultivating a sense of ownership among staff through transparent communication” (P08).

This sense of ownership makes employees more invested in contributing to sustainability efforts, as they perceive themselves as active participants in the company’s green journey.

OCB as a Reinforce of Environmental Performance

The study's findings indicate that OCB was not merely a by-product of green human resource management (GHRM) or green innovation; rather, it plays a reinforcing role in driving corporate environmental performance (CEP). Effective GHRM and green innovation programs provide the necessary framework for encouraging OCB, but the active participation of employees in OCB serves to sustain and enhance environmental performance over time.

Voluntary green actions such as energy-saving initiatives, waste reduction practices, and eco-friendly behavior beyond formal job requirements act as multipliers of the organization's green strategies. When employees take ownership of green projects and seek to improve processes, they help amplify the company's overall environmental impact.

By motivating employees through recognition, rewards, and a culture of shared environmental responsibility, companies can create a virtuous cycle where OCB reinforces green performance, further embedding sustainability as a core business objective.

organizational citizenship behavior (OCB) plays a central role in advancing corporate green initiatives. Through voluntary behaviors like participation in green teams, reporting inefficiencies, and suggesting improvements, employees contribute significantly to environmental performance. Organizational recognition and reward systems were critical enablers of OCB, motivating employees to engage in green actions. Moreover, cultivating a green organizational culture through transparent communication and shared environmental norms helps sustain these behaviors over time, creating a virtuous cycle of engagement, innovation, and improvement. OCB not only results from effective GHRM and green innovation but also serves to reinforce and sustain environmental performance, making it an indispensable factor in achieving corporate sustainability goals.

4. Corporate environmental performance (CEP)

Corporate environmental performance (CEP) represents the outcome of comprehensive and integrated green strategies that involve green human resource management (GHRM), green innovation (GI), and organizational citizenship behavior (OCB). The study revealed that these efforts have led to notable improvements in environmental performance, but challenges still persist, particularly in measuring individual contributions and balancing short-term business pressures with long-term sustainability goals. Here's a deeper exploration of these findings:

Key Achievements in CEP

Interviewees consistently reported improvements in corporate environmental performance (CEP), particularly attributed to the combined efforts of GHRM, GI, and OCB.

Integrated GHRM and GI efforts were recognized for contributing to environmental performance improvements. Interviewees noted the importance of this integrated approach,

where sustainable HR practices align with innovative green technologies to achieve more significant outcomes.

“Environmental performance had steadily improved due to integrated GHRM and GI efforts” (P01).

This indicates that green HR practices, such as employee training on sustainability and the implementation of green performance incentives, were working in tandem with technological advancements like energy-efficient devices and sustainable material sourcing to drive improvement.

OCB was acknowledged as playing a complementary role, particularly in terms of employee-driven initiatives that go beyond the formal responsibilities. Employees’ voluntary participation in green activities had directly influenced CEP, demonstrating the significant impact of organizational citizenship behavior in achieving green goals.

“Corporate environmental metrics show positive trends, partly credited to OCB” (P02).

This supports the idea that OCB, such as waste reduction, energy conservation, and eco-friendly suggestions, significantly contributes to the company’s overall environmental performance.

Together, these multi-faceted strategies have resulted in reductions in emissions, lower energy consumption, and waste minimization, thus advancing corporate environmental sustainability.

Challenges in Achieving CEP

Despite the positive trends in CEP, several challenges remain, which highlight areas where further improvements were needed for long-term success:

Measuring Individual Contributions

One of the major challenges identified was the difficulty in measuring individual contributions to environmental performance. While overall environmental KPIs have shown improvement, it remains a challenge to accurately assess the specific impact that individual actions have on achieving green goals.

“Environmental KPIs have improved, but challenges exist in measuring individual contributions accurately” (P04).

This issue points to the need for refined measurement systems and individual performance indicators that can more effectively quantify the impact of individual employees’ green behaviors on overall corporate performance.

Balancing Short-Term Business Pressures with Long-Term Sustainability Goals

Another significant challenge mentioned by respondents was the tension between short-term business pressures and long-term sustainability objectives. In fast-paced industries like telecommunications, where immediate financial returns and market competitiveness were often prioritized, companies may face difficulty aligning these short-term imperatives with the long-term commitment to environmental sustainability.

“Short-term business pressures conflict with long-term sustainability goals” (P01).

This tension suggests the need for strategic planning that incorporates both short-term business goals and long-term sustainability targets to create a more balanced approach to achieving both economic success and environmental responsibility.

Insufficient Cross-Department Collaboration

Cross-department collaboration emerged as another barrier to achieving CEP. Respondents highlighted the importance of integrated efforts across all departments in the company to accelerate environmental progress. The lack of seamless collaboration between HR, R&D, procurement, and operations can slow down the implementation of green strategies.

“More cross-department support would accelerate environmental progress” (P06).

This indicates the need for cross-functional teams that can work together on green projects and provide mutual support to enhance sustainability outcomes across all areas of the organization.

Need for Greater Technological Investment

There was also a recognition that companies need to invest more in green technologies and research & development to stay competitive in their sustainability efforts. While green technologies have made significant strides, there was a call for faster upgrades and increased investment in R&D to stay ahead of environmental regulations and competitors.

“Faster technology upgrades and increased R&D investment were needed” (P07).

This underscores the importance of ongoing innovation in green technology, ensuring that the company’s infrastructure, products, and services were optimized for sustainability and efficiency.

Recommendations for Improvement

Given these challenges, several recommendations emerged for enhancing the integration of green strategies and achieving sustained success in corporate environmental performance (CEP):

Enhance Systemic Integration of Green Strategies

It’s crucial for organizations to further integrate GHRM, GI, and OCB into a cohesive

green strategy. This means ensuring that all departments, from HR to operations to R&D, were aligned with sustainability goals and collaborate effectively. Strategic alignment between all business units will help accelerate green initiatives and ensure that sustainability becomes a core objective across the entire organization.

Develop Precise Performance Metrics

Improving the accuracy and precision of performance metrics was essential for tracking individual contributions to environmental performance. Organizations should implement personalized environmental KPIs that were linked to specific green behaviors and actions of employees. This would help in providing clearer insights into how individual efforts contribute to the overall environmental impact.

Foster Cross-Departmental Collaboration

Enhancing cross-departmental collaboration was critical to driving progress in environmental sustainability. Encouraging regular communication and joint efforts between HR, R&D, procurement, and operations will ensure that sustainability practices were seamlessly integrated across all business functions, leading to more efficient and innovative green solutions.

Invest in Green Technology and Innovation

Companies should continue to increase their investment in green technologies and sustainable innovations. This includes upgrading infrastructure to utilize renewable energy, implementing energy-efficient technologies, and developing eco-friendly products. Continuous innovation will not only improve CEP but also provide a competitive edge in a sustainability-conscious market.

Embed Green Values into Organizational Culture

Sustained success in environmental performance requires embedding green values into the corporate culture. Companies should promote a culture of sustainability where every employee feels personally responsible for contributing to the company's environmental goals. This can be achieved through transparent communication, employee engagement programs, and recognition for green efforts.

In conclusion, while the study highlighted significant improvements in corporate environmental performance (CEP) due to integrated efforts in GHRM, GI, and OCB, challenges such as measuring individual contributions, balancing short-term pressures with long-term goals, and fostering cross-departmental collaboration remain. By addressing these challenges through enhanced system integration, precise performance metrics, and increased investment in green technologies, companies can achieve sustainable and measurable

improvements in their environmental performance. The key to long-term success lies in embedding green values into the organizational culture, continuously innovating, and maintaining cohesive efforts across departments.

4.7 Integration of Qualitative and Quantitative Analysis Results

1. Green human resource management (GHRM)

Quantitatively, the survey results reveal that GHRM practices were positively perceived among Chinese telecom employees, with a mean score of 3.644 and strong internal consistency (Cronbach's Alpha = 0.917). The structural equation model (Table 4.9) confirms GHRM's significant direct effect on organizational citizenship behavior (standardized estimate = 0.500, $p < 0.001$), green innovation (0.187, $p = 0.002$), and corporate environmental performance (0.143, $p = 0.006$). The bootstrap analysis (Table 4.10) further indicates that GHRM accounts for 33.2% of the total direct effect on CEP and plays an even larger role indirectly through OCB and GI (66.8%).

These quantitative findings align closely with qualitative insights from the Interviews and interviews. For example, participants emphasized the comprehensive nature of GHRM: "Our recruitment emphasizes candidates' environmental awareness and commitment" (P01), and "Training programs include sustainability modules that actively engage employees" (P02). The key role of HR managers as bridges between strategic intent and operational execution was consistently highlighted: "HR managers play a crucial role in implementing green HRM practices" (P01). These comments reinforce the survey evidence that well-designed HRM systems can effectively embed green values in organizational culture and practices.

However, qualitative data also pointed out practical challenges not fully captured by quantitative scales. One participant noted, "Sometimes the green performance indicators were too generic, making it hard to translate them into daily tasks" (P04). This suggests that although GHRM practices are in place, their operationalization may need further refinement to improve employee clarity and motivation. This insight can guide future questionnaire improvements and targeted organizational interventions.

These findings suggest that the implementation of GHRM practices in the telecom sector not only fosters a pro-environmental culture but also effectively channels employee behavior and innovation toward sustainability goals. The strong direct and indirect effects revealed by the structural model indicate that GHRM serves as a foundational mechanism driving both individual (OCB) and organizational (GI and CEP) environmental outcomes.

Moreover, the alignment between qualitative and quantitative results strengthens the validity of the findings, illustrating that GHRM was not merely a formal policy but a lived experience among employees.

To translate these results into practice, organizations should prioritize the customization of GHRM tools—such as setting role-specific environmental KPIs and designing interactive, context-relevant training modules—to bridge the gap between strategic intentions and operational reality. Furthermore, by empowering HR professionals with adequate resources and authority, companies can enhance the consistency and effectiveness of GHRM deployment. These insights underscore the critical role of GHRM in shaping a green-capable workforce and advancing corporate sustainability agendas.

2. Green innovation (GI)

The quantitative data reflect moderately high engagement in green innovation, with a mean of 3.687 and Cronbach's Alpha of 0.899, indicating reliable measurement. GI had a direct positive effect on CEP (standardized estimate = 0.423, $p < 0.001$), showing its critical role in improving environmental outcomes. GI was also positively influenced by both GHRM and OCB, highlighting a complex pathway where human resources and employee behaviors fuel innovation.

Qualitative interviews enrich these findings by illustrating how innovation manifests in practice: "We encourage idea-sharing platforms where employees propose energy-saving projects" (P01) and "Adopting energy-efficient devices and optimizing network operations have brought measurable benefits" (P07). Such comments provide concrete examples behind the statistical relationships and show that GI extends beyond technology to organizational processes and culture.

Yet, interviewees also noted barriers to innovation speed and scale: "Faster technology upgrades and increased R&D investment were needed" (P07), and "Sometimes innovation ideas face resistance due to lack of cross-departmental support" (P06). These remarks highlight the limits of current GI efforts and suggest avenues for enhancing innovation diffusion, which quantitative results alone may understate.

These findings suggest that while green innovation initiatives were present and moderately effective, there was still substantial room for improvement in their scale, integration, and organizational acceptance. Companies should focus on enhancing internal collaboration by breaking down departmental silos, implementing cross-functional innovation teams, and incorporating environmental objectives into daily performance metrics. To address the observed resistance, structured innovation management systems should be introduced,

including feedback loops, recognition mechanisms for green initiatives, and leadership training to foster a supportive innovation climate. Moreover, targeted investment in green R&D and technological infrastructure can accelerate the pace of innovation and increase its environmental impact. These strategic shifts can ensure that innovation becomes a systematic, inclusive process rather than sporadic or isolated efforts.

A particularly salient outcome from the study was that green innovation (GI) emerges as the most critical driver in enhancing corporate environmental performance (CEP). While multiple factors—such as green human resource management (GHRM) and organizational citizenship behavior for the environment (OCBE)—contribute to shaping the sustainability landscape within organizations, It was GI that directly and significantly translates strategic intentions and employee behaviors into tangible environmental outcomes.

Unlike other variables that operate more indirectly or contextually, GI functions as the operational engine through which environmental goals were materialized. It encompasses a broad spectrum of actions, from the adoption of energy-efficient technologies and low-carbon processes, to the reengineering of workflows, eco-friendly product design, and digital optimization of resource usage. These innovation activities bridge the gap between intention and impact, ensuring that environmental aspirations were not confined to policy declarations but were embedded in daily operations and measurable performance improvements.

The strength and statistical significance of GI's impact on CEP (as shown in the structural model) confirm that green innovation was not merely a complementary element, but a central mechanism in achieving sustainability goals. Organizations that actively promote and institutionalize green innovation were better positioned to reduce emissions, minimize waste, optimize resource use, and respond adaptively to environmental regulations and stakeholder expectations. This not only enhances their environmental performance but also positions them competitively in green-conscious markets and among ESG-focused investors.

Moreover, GI serves as a convergence point for other organizational efforts. GHRM creates the structural and cultural preconditions for innovation, while OCBE provides the motivational and behavioral foundation. But it was GI that synthesizes these inputs into concrete practices with measurable environmental benefits. In this sense, GI was both an outcome of enabling conditions and a pathway to high-impact results.

In conclusion, the findings underscore that without a strong commitment to green innovation, other sustainability-oriented efforts may remain superficial or fragmented. To truly elevate corporate environmental performance, green innovation must be treated as a strategic priority, supported by robust investment, integrated systems, and leadership accountability. It

was through GI that sustainable transformation becomes not just possible, but operationally real.

3. Organizational citizenship behavior (OCB)

OCB showed a solid average score (mean = 3.647) and reliability (Cronbach's Alpha = 0.870), with strong correlations to both GHRM and GI. Structural modeling revealed OCB as a significant mediator linking GHRM to GI (standardized effect = 0.348) and CEP (0.268). This underscores the importance of employees' voluntary pro-environmental behaviors in translating policies into tangible outcomes.

The qualitative data provided rich descriptions of these behaviors: "Green teams initiate recycling and energy conservation drives" (P02) and "Employees voluntarily report inefficiencies and suggest improvements" (P06). Moreover, organizational recognition emerged as a key driver: "Employees feel valued for their green contributions through awards and career incentives" (P01, P04). These real-world illustrations validate the survey findings that OCB was both widespread and impactful.

However, qualitative feedback also identified cultural and motivational challenges: "Not all employees understand how their extra efforts align with corporate goals" (P10), suggesting that enhancing communication and embedding green values more deeply may improve OCB further. This insight points to opportunities for expanding training and leadership support, complementing the quantitative emphasis on formal incentives.

The study highlights the pivotal role of organizational citizenship behavior (OCB) as a behavioral was bridge connecting green human resource management (GHRM) practices with enhanced corporate environmental performance (CEP). While the current level of OCB engagement moderate to high, as evidenced by its strong average score and significant mediating effects, its full potential can be further harnessed through more targeted organizational strategies. First, organizations must articulate a clearer and more compelling narrative that links employees' voluntary green actions with the company's broader environmental and strategic goals. When employees understand how their contributions support the larger mission, their engagement becomes more purposeful and sustained. This can be achieved through effective internal communication, visual progress updates, and frequent reinforcement from leadership. Additionally, internal storytelling and leadership role modeling were crucial for shaping behavior; when green efforts were recognized and shared, they were more likely to be replicated. Institutionalizing OCB into HR systems helps formalize these behaviors and integrate them into the organizational fabric. Furthermore, to address differences in individual motivation, companies should implement personalized recognition mechanisms,

values-driven leadership training, and peer acknowledgment platforms that reinforce a culture of shared environmental responsibility. Collectively, these approaches can transform green citizenship from an isolated initiative into a widespread norm, thereby strengthening the behavioral pathways through which GHRM drives improved environmental outcomes.

4. Corporate environmental performance (CEP)

Among the four variables, CEP received the highest average rating (mean = 3.795, Cronbach's Alpha = 0.937), reflecting a generally positive perception of environmental outcomes. The SEM results confirm that CEP was significantly influenced by GHRM, GI, and OCB both directly and indirectly, with GI having the strongest direct effect (0.423).

Interviewees confirmed the positive trend but also highlighted measurement challenges and ongoing pressures: "Environmental performance had steadily improved due to integrated GHRM and GI efforts" (P01), yet "There were challenges in measuring individual contributions accurately" (P04), and "Short-term business pressures sometimes conflict with sustainability goals" (P01). These nuanced perspectives add depth to the statistical results, showing that while progress was evident, balancing environmental and economic priorities remains complex.

Additionally, qualitative data suggested enhancing interdepartmental collaboration and investment in new technologies to sustain CEP growth: "More cross-department support would accelerate progress" (P06), "Greater R&D investment was necessary" (P07). These recommendations complement the quantitative findings and provide practical guidance for companies aiming to improve their environmental performance further.

The findings indicate that while corporate environmental performance (CEP) was perceived positively and strongly influenced by green human resource management (GHRM), green innovation (GI), and organizational citizenship behavior (OCB), there remain practical challenges in fully realizing and sustaining these outcomes. To build on the positive momentum, organizations should focus on developing more accurate and comprehensive measurement systems that capture both individual and collective contributions to environmental goals. Enhancing cross-departmental collaboration was critical to breaking down silos and fostering integrated efforts that drive innovation and sustainability. This can be achieved through structured interdepartmental projects, shared performance metrics, and regular communication channels that promote transparency and joint accountability. Moreover, sustained investment in research and development was essential to support technological advancements that underpin green innovation, ensuring continuous improvement in environmental outcomes. By addressing these areas, companies can better align their environmental and business objectives,

create more robust support systems for green initiatives, and maintain long-term progress in corporate environmental performance.

The integrated analysis reveals strong consistency between quantitative and qualitative findings, reinforcing the validity and richness of the study's conclusions. Quantitative data demonstrate robust relationships among GHRM, GI, OCB, and CEP, while qualitative insights offer concrete examples, reveal implementation challenges, and suggest improvements. Together, they suggest that effective green HRM practices foster employee citizenship and innovation, which in turn drive enhanced environmental performance. Nevertheless, continuous refinement of HR systems, innovation support, communication, and measurement practices was needed to deepen impact and overcome practical barriers.

This study proposes an integrated model examining the influence of green human resource management (GHRM) on corporate environmental performance (CEP) through the mediating roles of green innovation (GI) and organizational citizenship behavior (OCB). GHRM practices, including environmentally conscious recruitment, green training programs, and performance-based incentives, cultivate employees' environmental commitment and facilitate the implementation of green initiatives. These practices foster the adoption of green technologies and energy-saving innovations, while encouraging voluntary pro-environmental behaviors and green teamwork among employees. green innovation and OCB act as critical mediators, bridging the relationship between GHRM and CEP by enhancing organizational capabilities and embedding a culture of environmental responsibility. The model underscores the synergistic interplay between strategic human resource management, technological innovation, and discretionary employee behaviors, ultimately contributing to improved environmental outcomes and sustainable competitive advantage.

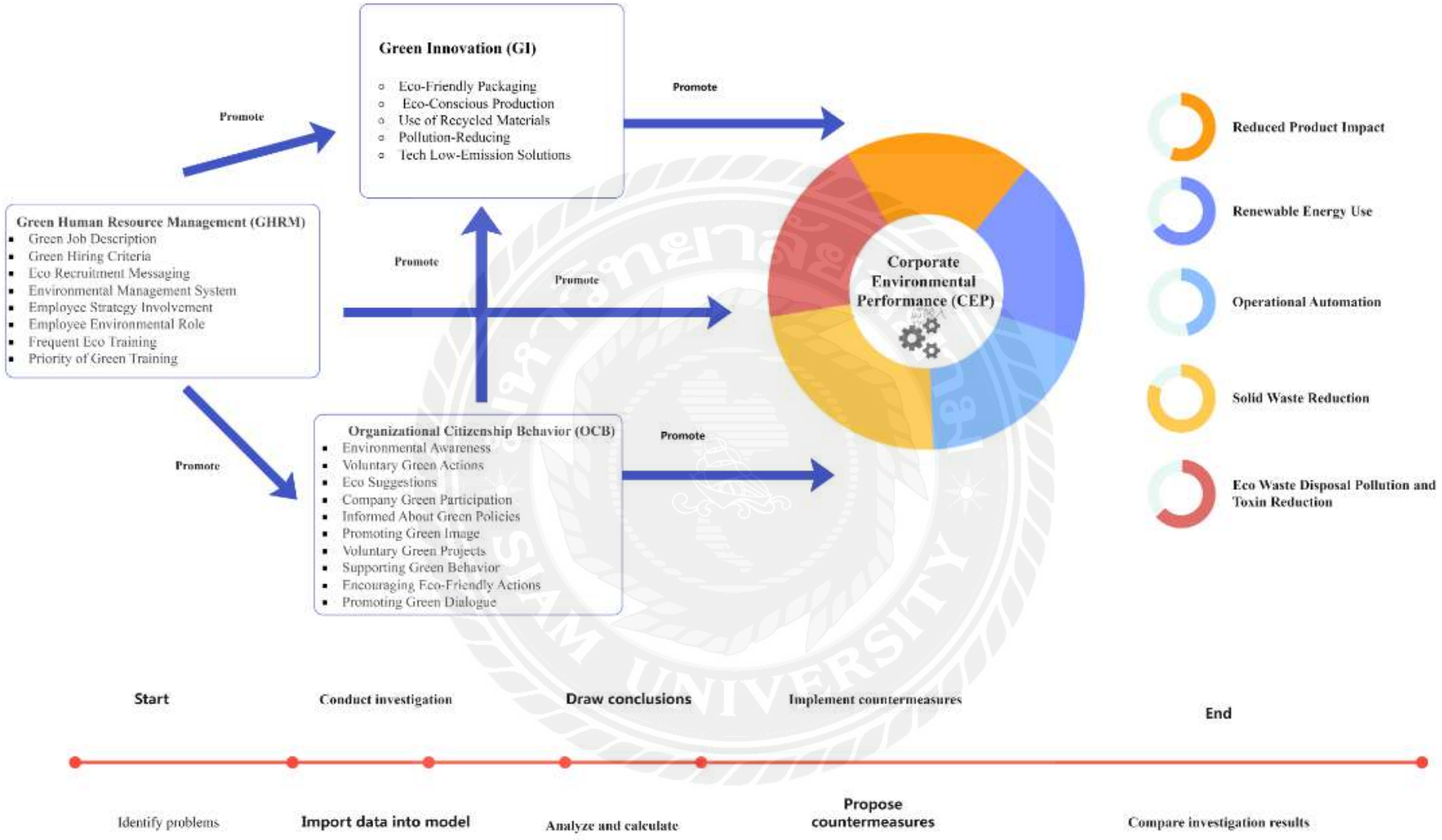

Figure 4.3 Model for the Competitiveness of Chinese Telecommunications Companies
Source: Researcher, 2025

To further refine and enhance the application of this model in promoting corporate environmental performance (CEP) in Chinese telecommunications companies. The following improvements ensure a scientifically rigorous, practical, and comprehensive approach. This approach emphasizes the integration of green human resource management (GHRM), green innovation (GI), and organizational citizenship behavior (OCB) as key drivers of CEP, while also incorporating a continuous feedback loop for systematic improvement.

(1) Strengthening green human resource management (GHRM)

Recruitment & Selection:

•Integration of Sustainability Competencies: Instead of just adding green criteria to job descriptions, the recruitment process should focus on assessing candidates' green competencies, such as their ability to innovate within sustainability contexts, their prior experience with environmental initiatives, and their understanding of green technologies. This ensures that hired employees were not only eco-conscious but also equipped with the skills to drive green initiatives.

Training & Development:

•Green Leadership Development: In addition to regular eco-training, create specialized leadership programs focused on leading sustainable transformation, ensuring that employees at all levels, especially managers, were equipped to inspire green change. This could include training on carbon footprint reduction, sustainable supply chain management, and green marketing.

Employee Engagement:

•Green Ambassadors: Rather than just defining roles in environmental projects, establish "green ambassador" programs where employees from various departments were given responsibilities to champion sustainability initiatives. This promotes ownership and amplifies the internalization of green values across the organization.

Outcome: This approach strengthens employee buy-in for sustainability practices, making them active agents of change within the company.

(2) Fostering organizational citizenship behavior (OCB)

Encourage Voluntary Green Actions:

•Incentivized Green Behaviors: Expand recognition programs to include both intrinsic and extrinsic rewards. For instance, offer public recognition, financial incentives, or career advancement opportunities for employees who make significant contributions to green innovation, operational efficiency, or resource conservation.

Promote Green Dialogue:

•Eco-focused Performance Appraisals: Integrate sustainability-related KPIs into employees' performance reviews. This can include contributions to reducing energy usage, waste reduction, or the successful completion of green projects. Incorporating these into the evaluation criteria helps reinforce green values as part of the company's performance culture.

Support Green Projects:

•Collaborative Green Initiatives: Encourage cross-functional collaboration for green projects to address complex sustainability challenges, thereby promoting teamwork across departments such as R&D, operations, and marketing. This ensures that environmental innovation was not soloed and involves all parts of the organization.

Outcome: Voluntary actions become deeply embedded in organizational culture, leading to a stronger collective effort toward sustainability.

(3) Accelerating green innovation (GI)

Product & Process Innovations:

•Circular Economy Principles: Rather than focusing solely on eco-friendly packaging and low-emission technologies, adopt circular economy principles. This includes designing products for easier disassembly and reuse, as well as using biodegradable or recyclable materials in the production process to minimize long-term environmental impact.

Production & Operations:

•Carbon-Neutral Operations: Expand the use of renewable energy by adopting strategies to make the entire telecom network carbon-neutral. This could include deploying solar-powered telecom towers or purchasing carbon offsets to balance out emissions from non-renewable energy sources.

Outcome: These strategies will significantly reduce the ecological footprint while creating new market opportunities and enhancing product differentiation in the eco-conscious consumer space.

(4) Enhancing corporate environmental performance (CEP)

CEP can be systematically improved by focusing on the following pillars:

•Energy & Emissions Management: Regular audits and monitoring of energy consumption and emissions levels within the company's infrastructure, especially network towers and data centers, will ensure that the company stays on track to meet sustainability targets.

•Sustainable Supply Chain: Integrate sustainable procurement practices into the company's supply chain. This includes working with suppliers who adopt green practices, using eco-friendly raw materials, and ensuring that products were sourced ethically.

•Environmental Impact Measurement: Develop a comprehensive Environmental Impact Measurement System (EIMS) that tracks and reports on key sustainability metrics such as CO2 emissions, resource usage, and e-waste recycling rates. This system will facilitate better decision-making, and provide real-time data to guide improvements.

Outcome: Continuous environmental performance improvement leads to long-term cost savings, compliance with international regulations, and a stronger reputation as a sustainability leader in the telecom sector.

(5) Continuous Improvement Cycle (Bottom Path in Model)

The continuous improvement cycle should be made more actionable by implementing the following steps:

•Environmental Benchmarking: Compare the company's environmental performance with global standards and industry benchmarks (e.g., ISO 14001, Green Building certifications). This helps identify areas of underperformance and the best practices that can be adopted from global leaders in sustainability.

•Real-Time Environmental Dashboards: Develop real-time environmental performance dashboards that provide constant monitoring and feedback on energy usage, waste generation, and emissions. These dashboards can be used by decision-makers to adjust operations swiftly to avoid inefficiencies and environmental impacts.

•Sustainability Audits & Reviews: Implement quarterly or annual sustainability audits to evaluate the effectiveness of green policies and projects. This review can identify new areas of opportunity, such as emerging green technologies or policy changes that need to be integrated into the business model.

Outcome: A robust cycle of monitoring, evaluating, and adjusting green initiatives leads to sustained environmental improvements and innovation over time.

To practically implement this enhanced model, telecom companies should consider the following steps:

Embed Green HR Policies: Integrate sustainability into employee recruitment, performance evaluation, and training, aligning employees with the company's green goals.

Foster Grassroots Green Movements: Encourage employees at all levels to participate in green initiatives through clear recognition systems, volunteer programs, and innovation competitions.

Invest in Eco-friendly Technologies: Commit to investing in low-carbon technologies such as green 5G, energy-efficient infrastructure, and eco-friendly devices to improve both environmental performance and operational efficiency.

Monitor & Report Regularly: Establish a transparent reporting system for environmental performance, and regularly disclose progress in environmental impact, meeting the expectations of stakeholders and regulators.

Collaborate for Greater Impact: Engage in partnerships with other firms, NGOs, and governmental bodies to share best practices, tackle shared environmental challenges, and set industry-wide green benchmarks.

CHAPTER 5
RESEARCH CONCLUSION, DISCUSSION AND RECOMMENDATION

This chapter concludes the results obtained from the qualitative and quantitative analysis in Chapter 4. It also discusses the study's theoretical and practical contributions, and lists the limitations of this study and suggestions for future research. There are 5 sections as follow:

5.1 Research Conclusion

5.2 Discussion

5.3 Recommendation

5.4 Research Limitation

5.5 Future Research

5.1 Research Conclusion

In total, 400 questionnaires were distributed, with 399 returned. During the data processing phase, questionnaires with missing values or completed in less than 30 seconds were excluded. The questionnaire response rate was 99.75%. Data cleaning ensured the rationality of the dataset. This research mainly answers three questions respectively:

(1) What is the effect of green human resource management (GHRM), green innovation (GI) and organizational citizenship behavior (OCB) on corporate environmental performance (CEP) in Chinese telecommunication enterprises?

The findings of this study indicated that green human resource management (GHRM), green innovation (GI), and organizational citizenship behavior (OCB) all exerted significant positive effects on corporate environmental performance (CEP) in Chinese telecommunication enterprises. Among them, GI demonstrated the strongest direct influence (standardized coefficient = 0.423, $p < 0.001$), highlighting its role as the core driver of environmental improvement. OCB also positively affected CEP (0.268, $p < 0.001$) and further enhanced it indirectly by fostering GI (OCB → GI = 0.348, $p < 0.001$). While GHRM directly influenced CEP (0.143, $p = 0.006$), its impact was predominantly transmitted through OCB and GI (indirect effect = 0.287, accounting for 66.8% of the total effect), with a total effect of 0.429 ($p < 0.001$), underscoring its systemic significance.

Quantitative survey data showed that the mean scores of all four variables exceeded 3.6 with high reliability (α = 0.870–0.937), reflecting employees' broad recognition of corporate green practices. The interview results further validated the statistical model: GHRM was reflected in emphasizing environmental awareness during recruitment, embedding sustainability modules in training, and incorporating green indicators into performance appraisals; GI involved not only the adoption of energy-saving equipment and network optimization but also supplier sustainability evaluation and process improvements driven by cross-departmental collaboration; OCB was manifested in employees voluntarily forming green teams, proactively suggesting improvements, and actively participating in energy-saving initiatives, which were continuously reinforced by organizational recognition and incentives. Overall, respondents perceived that corporate environmental performance had been steadily improving, particularly in terms of reduced emissions, energy consumption, and waste, although challenges remained, such as the tension between short-term business pressures and long-term green goals, insufficient cross-departmental collaboration, and the limited operability of green performance indicators. The integration of quantitative and qualitative evidence demonstrated that systematic GHRM practices cultivated a green culture and employee responsibility, which, in synergy with OCB and GI, significantly enhanced CEP, thereby revealing the collaborative mechanism linking strategic HR practices, voluntary employee behaviors, and green innovation.

(2) What is the effect of green human resource management (GHRM) through green innovation (GI) and organizational citizenship behavior (OCB) on corporate environmental performance (CEP) in Chinese Telecommunication Enterprises?

Based on both the quantitative and qualitative findings, the effect of green human resource management (GHRM) on corporate environmental performance (CEP) in Chinese telecommunication enterprises was both significant and multifaceted, with green innovation (GI) and organizational citizenship behavior (OCB) serving as crucial mediating pathways.

The structural equation modeling results reveal that GHRM exerts a total effect of 0.429 on CEP, with 66.8% of this effect explained through the mediating roles of GI and OCB. Specifically, GHRM significantly influences OCB ($\beta = 0.264$, $p < 0.001$) and GI ($\beta = 0.187$, $p < 0.01$), while GI demonstrates the strongest direct effect on CEP ($\beta = 0.423$, $p < 0.001$). Furthermore, OCB also positively predicts GI ($\beta = 0.348$, $p < 0.001$), confirming a sequential mediating mechanism in which employees' voluntary pro-environmental behaviors create a supportive context for green innovation, which in turn drives measurable improvements in environmental outcomes such as energy efficiency, emission reduction, and sustainable network management.

Interview results support these statistical findings by illustrating how employees perceive the role of GHRM practices in shaping their green behaviors and innovation contributions. For example, respondents noted that environmental training and cross-departmental collaboration platforms enhanced their awareness and ability to contribute to sustainability projects. Some employees emphasized that recognition and incentives motivated them to engage in extra-role environmental behaviors, such as voluntarily leading recycling initiatives or suggesting operational improvements. Others highlighted that organizational support for green projects encouraged experimentation with new technologies, which translated into practical innovations like energy-saving equipment upgrades or optimized network operations. These narratives confirm that OCB serves as a behavioral bridge, transforming HRM practices into collective action, while GI provides the structural and technological means to convert such actions into measurable performance improvements.

Taken together, the integration of quantitative and qualitative results demonstrates that GHRM enhances CEP not only through direct alignment of human capital with environmental objectives but more critically through its indirect influence on fostering a culture of voluntary green behaviors and facilitating innovative practices. This dual pathway underscores the importance of strategically embedding GHRM within telecommunication enterprises: while OCB strengthens the organizational climate for sustainability, GI acts as the pivotal mechanism that converts employee behaviors and capabilities into sustainable performance outcomes.

(3) How can corporate environmental performance be evaluated and guided in Chinese telecommunication enterprises?

Based on the qualitative findings of this study, corporate environmental performance (CEP) in Chinese telecommunication enterprises can be evaluated and guided through a combination of systematic measurement, employee engagement, and process-oriented management. Interviewees emphasized that embedding clear environmental indicators into performance assessment systems was crucial: “Environmental KPIs have improved, but challenges exist in measuring individual contributions accurately” (P04). This suggests that CEP evaluation should include both organizational-level metrics, such as reductions in emissions, energy consumption, and waste, and individual-level contributions, ensuring that employees’ green efforts were recognized and incentivized.

Moreover, guiding CEP requires fostering an integrated green culture where employees were encouraged to participate actively in environmental initiatives. For instance, employees highlighted the role of voluntary actions: “Green teams initiate recycling and energy conservation drives” (P02), and “Employees voluntarily report inefficiencies and suggest improvements” (P06). Such practices indicate that CEP can be enhanced not only through top-down directives but also by enabling bottom-

up initiatives, where employees' organizational citizenship behaviors were harnessed to support environmental goals.

Additionally, process improvement and cross-departmental collaboration were identified as key guidance mechanisms. Respondents noted: "More cross-department support would accelerate environmental progress" (P06), and "Procurement adopts new supplier evaluation criteria focused on sustainability" (P12). These statements illustrate that CEP management should extend beyond technical measures to include organizational practices, supply chain management, and interdepartmental coordination. Finally, respondents stressed the importance of continuous investment and adaptation: "Faster technology upgrades and increased R&D investment were needed" (P07). This highlights that guiding CEP was an ongoing process, requiring updated technologies, iterative process improvements, and responsive strategies aligned with sustainability objectives.

To further strengthen green human resource management (GHRM), telecommunications companies should focus on systematically integrating green criteria into their recruitment and selection processes. By incorporating sustainability-related qualifications and eco-experience into job descriptions, companies can ensure that they attract employees who not only meet job requirements but also bring an inherent understanding and commitment to environmental responsibility. For example, telecommunications companies can highlight sustainability experience or previous green initiatives as desirable attributes, thereby fostering a culture of environmental awareness from the outset of recruitment.

In addition, training and development play a pivotal role in ensuring employees continuously update their environmental knowledge and practices. Frequent eco-training sessions should be organized for employees, and sustainability can be incorporated as a core module within the organization's training programs. This ensures that employees understand the latest environmental regulations and innovations, thereby empowering them to contribute more effectively to the company's green initiatives. Moreover, integrating employee engagement into environmental strategies ensures active participation. Defining roles for employees in specific green projects, such as waste reduction initiatives or energy conservation efforts, further enhances their sense of responsibility towards sustainability. Through such actions, organizations can build a workforce that actively practices and champions green values, leading to significant contributions towards improving corporate environmental performance (CEP).

Organizational citizenship behavior (OCB) also plays a critical role in driving green initiatives forward. By encouraging voluntary green actions, companies can motivate employees to contribute ideas and actions that support environmental goals, even beyond their formal job responsibilities. For instance, recognizing and rewarding employees who suggest energy-saving ideas or actively engage

in eco-friendly activities creates a positive feedback loop that inspires others to follow suit. Establishing recognition programs—such as green awards or career advancement opportunities linked to environmental achievements—further motivates employees to engage in sustainability projects that benefit the organization. Furthermore, promoting green dialogue through platforms like townhalls or online forums allows employees to share ideas and suggestions, fostering a collaborative environment where sustainability can thrive. These platforms encourage open communication about green practices, helping employees feel empowered to contribute beyond the immediate scope of their roles. Supporting green projects, both within and outside the organization, can also enhance OCB by providing employees with the opportunity to lead or participate in voluntary environmental initiatives, making them more invested in the company's green vision.

When it comes to green innovation (GI), companies must prioritize both product and process innovations to achieve their sustainability goals. For example, adopting eco-friendly packaging and using recycled materials can help reduce the environmental impact of products from the very beginning. In addition, investing in low-emission technologies or pollution-reducing methods not only contributes to environmental sustainability but also enhances a company's competitiveness in an increasingly eco-conscious market. On the operational side, telecom companies should adopt renewable energy sources such as solar and wind power to fuel data centers and base stations, reducing their carbon footprint. Furthermore, implementing smart automation systems within the production and operational processes can help optimize energy consumption, reduce resource wastage, and improve overall efficiency. These green innovations contribute not only to the company's environmental goals but also provide a strategic advantage by lowering operational costs and enhancing brand reputation as a sustainable business.

Finally, corporate environmental performance (CEP) can be effectively measured and improved in several key areas. One of the most critical metrics was product impact, where telecom companies can focus on creating eco-friendly devices that were designed to have a longer product lifecycle, thereby reducing waste and e-waste generation. Additionally, renewable energy use within the company's operations, such as solar or wind-powered data centers, can further reduce carbon emissions. Operational automation, including the use of smart systems for managing energy use and waste, can significantly increase the efficiency of resources. Programs aimed at solid waste reduction, such as e-waste recycling, contribute to better waste management practices. The eco-waste disposal and toxin reduction methods ensure that the telecom company properly handles hazardous materials such as old hardware and batteries, minimizing environmental damage. Together, these efforts enhance corporate environmental performance, which can lead to cost savings, improved regulatory compliance, and an enhanced brand image as a leader in corporate sustainability.

The continuous improvement cycle in this model plays a key role in ensuring sustained progress in corporate environmental performance. Telecom companies must regularly identify problems, such as high levels of e-waste or excessive energy consumption, and input data into a model to track environmental KPIs. By analyzing this data, companies can pinpoint gaps in their green practices, such as energy inefficiency or product impacts, and propose countermeasures, such as adopting new green technologies or updating policies. Implementing these countermeasures was crucial for accelerating sustainability goals and improving CEP over time. Regular monitoring and comparison of results help track progress and identify areas for further improvement, ensuring that green strategies were continually evolving and contributing to long-term environmental sustainability.

In practice, telecommunications companies can adopt this model by embedding green HR policies that align employees with eco-goals, encouraging staff-led green behaviors and community projects, investing in innovative low-carbon technologies, and systematically monitoring and improving CEP indicators. By following this approach, telecom companies can enhance their environmental impact, reduce operational costs, and strengthen their position as environmentally responsible organizations, driving long-term sustainability.

(1) Theoretical Contributions

This study makes important theoretical contributions to the ESG literature, particularly in the areas of green human resource management and green innovation. It bridges the gap between existing research on GHRM, which predominantly focused on its role in recruitment and training, and the broader scope of organizational sustainability. By demonstrating how GHRM practices could directly and indirectly influence green innovation and employee behavior, the study provides new insights into how organizations could embed sustainability into the core of their HR policies. Furthermore, the study builds on the concept of organizational citizenship behavior (OCB) by linking voluntary employee behaviors to enhanced environmental performance, an area that had been underexplored in the context of ESG initiatives.

In addition, the research expands on the concept of green innovation, emphasizing that it was not solely confined to technological advancements but also included process and managerial innovations. This broader perspective on innovation help to enrich the understanding of how companies could leverage cross-department collaboration and grassroots involvement in driving green outcomes. Moreover, the study contributes to the ESG framework by exploring the interplay between employee behavior, management practices, and corporate strategies to achieve better environmental outcomes.

(2) Practical Contributions

From a practical perspective, the study provides actionable insights for telecommunications companies aiming to enhance their corporate environmental performance (CEP) within the ESG framework. It demonstrates the critical role of GHRM in creating a workforce that was not only skilled but also deeply engaged in the company's green initiatives. By incorporating green criteria into recruitment, training, and performance appraisals, companies could cultivate a culture of sustainability that aligned with their long-term environmental goals. The research also highlights the importance of employee engagement and organizational citizenship behavior (OCB) in driving sustainability beyond formal responsibilities. This underscores the value of fostering a green corporate culture that motivated employees to actively contribute to green projects.

Additionally, the findings suggest that green innovation was not solely a top-down approach but required collaboration and bottom-up input from employees across different levels. Companies could benefit from eco-friendly technologies, energy-efficient devices, and sustainable practices that not only reduced their environmental impact but also improved operational efficiency and competitiveness. Furthermore, the study underscores the importance of monitoring and continuously improving corporate environmental performance (CEP) through a structured approach, thereby ensuring that the company remained aligned with ESG principles and sustainability goals.

The study emphasizes that achieving long-term environmental sustainability was an ongoing process that required systematic integration of green strategies, clear performance metrics, and consistent employee involvement. By embedding green HR practices, fostering OCB, and accelerating green innovation, companies could significantly improve their corporate environmental performance (CEP) and contribute to a sustainable future. This research not only adds value to academic literature but also provides practical guidance for organizations committed to achieving higher ESG standards, particularly in the telecommunications sector.

5.2 Discussion

Research Question 1: What is the effect of green human resource management (GHRM), green innovation (GI) and organizational citizenship behavior (OCB) on corporate environmental performance (CEP) in Chinese telecommunication enterprises?

This study examined the mechanisms through which green human resource management (GHRM), green innovation (GI), and organizational citizenship behavior (OCB) contribute to corporate environmental performance (CEP) in Chinese telecommunication enterprises, and the

findings can be further interpreted through the Ability–Motivation–Opportunity (AMO) theory, the Resource-Based View (RBV), and Social Identity Theory. From the AMO perspective, GHRM practices enhanced employees' environmental capabilities, stimulated their motivation, and created opportunities for participation, thereby fostering voluntary green behaviors and innovation that ultimately improved CEP. Recruitment processes emphasizing environmental awareness, sustainability-oriented training, and performance appraisals with green indicators reflected the "ability" dimension; recognition and incentives reinforced "motivation"; and opportunities were provided through initiatives such as cross-departmental collaboration and green project participation. This mechanism was consistent with the results of the structural model, where the majority of GHRM's effects were mediated by OCB and GI, with indirect effects accounting for more of the total impact. However, the AMO framework was limited in its micro-level focus, as it overlooks broader institutional constraints and the path dependency of innovation capabilities. In capital-intensive industries such as telecommunications, large-scale environmental improvements often depend on resource allocation decisions and technological investments, which require integration with more macro-level perspectives (Jiang & Messersmith, 2018; Yu et al., 2020).

The RBV offers a complementary explanation by conceptualizing GI as a rare, valuable, and inimitable capability that creates sustained competitive and environmental advantages. The strong direct effect of GI on CEP observed in this study resonates with RBV assumption that unique capabilities, such as green technologies, sustainable processes, and innovation-oriented management, can be translated into tangible performance outcomes. For example, investments in green R&D, energy-efficient equipment, and sustainable supply chain practices enable enterprises to transform strategic resources into measurable reductions in emissions and energy consumption. GHRM, as a supporting practice, contributes to the accumulation and protection of these capabilities by developing human capital and fostering organizational learning. This was consistent with prior studies highlighting the role of HRM in enhancing firms' innovation-based resources to achieve long-term sustainability outcomes (Delery & Roumpi, 2017; Úbeda-García et al., 2021). Nevertheless, RBV tends to overemphasize the stability of resource heterogeneity, which may be less applicable in rapidly changing and policy-driven sectors such as telecommunications. In this context, the replicability and dynamic nature of green innovation capabilities may weaken their long-term protective advantage, calling for a dynamic capabilities lens to complement RBV (Teece, 2018).

Social Identity Theory further illuminates how OCB was structured by organizational culture and identity. When GHRM embedded green values into the employee lifecycle, it strengthened employees' identification with a "green organizational identity." This identification encouraged voluntary pro-environmental behaviors, such as joining green teams or proposing sustainability

initiatives, which extended beyond formal job requirements. Prior research had emphasized that identity-based mechanisms were crucial for sustaining voluntary green behaviors, particularly when external incentives were insufficient (Hameed et al., 2020; Siwei & Wongvanichtawee, 2023). Yet, the formation of green organizational identity was contingent on leadership narratives, organizational communication, and broader cultural contexts. In large Chinese telecommunication enterprises, where employees were shaped by multiple and sometimes conflicting identities the consistency of green identity may be fragmented. This suggests that fostering OCB and leveraging it to stimulate GI requires not only HRM practices but also deliberate identity-building strategies that resonate across diverse employee groups (Raman et al., 2019).

Taken together, integrating the AMO theory, RBV, and Social Identity Theory provides a comprehensive framework for interpreting the empirical findings. AMO explains the micro-level mechanisms through which GHRM activates OCB and GI; RBV highlights how GI, as a strategic capability, directly drives CEP while being shaped and supported by HRM; and Social Identity Theory underscores the role of organizational identity in sustaining voluntary behaviors that amplify the effects of HR practices. This theoretical integration aligns with the study's quantitative results, which showed that GHRM primarily exerted indirect effects through OCB and GI, and that GI had the strongest direct influence on CEP. It also had important managerial implications: enterprises must simultaneously design HRM practices that enhance employee abilities, motivations, and opportunities; invest in the long-term development and protection of green innovation capabilities; and build organizational identities that normalize and sustain pro-environmental behaviors. A critical reflection on the application of these theories in the telecommunication sector further suggests the need for longitudinal and comparative studies to examine the fluidity of green resources, the cultural variation in identity formation, and the boundary conditions of AMO-based HR practices under diverse institutional contexts.

Research Question 2: What is the effect of green human resource management (GHRM) through green innovation (GI) and organizational citizenship behavior (OCB) on corporate environmental performance (CEP) in Chinese Telecommunication Enterprises?

The effect of green human resource management (GHRM) on corporate environmental performance (CEP) in Chinese telecommunication enterprises can be understood through the mediating roles of green innovation (GI) and organizational citizenship behavior (OCB). GHRM functions as a systematic mechanism that shapes employee capabilities, motivation, and opportunities to engage in environmentally oriented behaviors, which in turn influence organizational innovation and environmental outcomes. Drawing on the ability-motivation-opportunity (AMO) framework, GHRM practices such as recruitment emphasizing environmental awareness, sustainability-oriented

training, and performance evaluation with green indicators enhance employees' environmental abilities, foster intrinsic and extrinsic motivation, and provide structured opportunities to participate in green initiatives. Similarly, the results corresponded with Raman and Downe (2019), demonstrating that organizational citizenship behaviors contributed positively to environmental outcomes when supported by appropriate managerial practices. This creates conditions in which employees voluntarily engage in pro-environmental behaviors and contribute to green innovation, illustrating the pathway through which micro-level HR practices translate into collective environmental performance.

From a resource-based view (RBV) perspective, green innovation represented a strategic organizational resource that was valuable, rare, and difficult to imitate, enabling sustained improvements in environmental performance. GHRM complements this by developing the human capital and organizational knowledge necessary to generate and maintain these capabilities. The present findings corroborated the observations of Hameed et al. (2020), who highlighted the significant role of voluntary employee initiatives in promoting green innovation within organizations. In this sense, the influence of GHRM on CEP was not merely procedural; it functions as a capability-building system that nurtures innovation as a core resource, demonstrating how internal practices can convert into tangible performance advantages.

The lens of social identity theory, particularly the concept of green organizational identity (GOI), helps explain the stability and persistence of voluntary pro-environmental behaviors. By embedding green values into employee experiences, GHRM cultivates an organizational identity that employees internalize, motivating discretionary behaviors that support innovation and sustainability goals even in the absence of external incentives. The findings of this study are consistent with those reported by Siwei and Wongvanichtawee (2023), who found that a strong green organizational identity effectively stimulates employees' pro-environmental behaviors. This identity-based mechanism reinforces OCB and provides a cultural context that strengthens the translation of individual actions into organizational outcomes.

Integrating these perspectives, GHRM's effect on CEP can be conceptualized as a synergistic process: it cultivates employee abilities, motivation, and opportunities to engage in green behaviors (AMO), channels these behaviors into the generation of strategic resources through innovation (RBV), and embeds them within a shared organizational identity that reinforces sustainable practices (social identity theory). This integrated framework highlights the complementary roles of micro-level practices, resource accumulation, and cultural identity in translating human resource management into measurable environmental performance, illustrating a multi-level mechanism that connects HR strategies, employee agency, and organizational sustainability outcomes.

Research Question 3: How can corporate environmental performance be evaluated and guided in Chinese telecommunication enterprises?

Evaluating and guiding corporate environmental performance (CEP) in Chinese telecommunication enterprises requires a comprehensive and multi-dimensional approach that integrates both structural mechanisms and behavioral dynamics. From a strategic perspective, CEP evaluation should extend beyond traditional environmental metrics, such as emissions reduction, energy efficiency, and waste management, to incorporate the effectiveness of organizational practices, employee engagement, and innovation processes. Quantitative indicators alone cannot fully capture the influence of discretionary employee behaviors, cross-departmental collaborations, and the integration of green innovation into operational processes, which were critical drivers of sustained environmental outcomes. This aligns with the notion that organizational performance was co-created through both formal systems and informal employee contributions, highlighting the need for blended evaluation frameworks that reconcile objective metrics with qualitative assessments of employee and process-level engagement.

Guiding CEP necessitates a systemic orientation, where corporate policies, management practices, and technological investments were synergistically aligned with sustainability objectives. green human resource management practices, including targeted recruitment, sustainability-oriented training, and performance-linked incentives, can cultivate employee capacity, motivation, and opportunity, thereby embedding pro-environmental behaviors and innovative initiatives into the organizational fabric. Simultaneously, structural mechanisms—such as integrated process management, sustainable supply chain evaluation, and cross-functional collaboration platforms—ensure that innovation and environmental practices were scalable and institutionally reinforced. This multi-layered guidance approach was consistent with AMO theory, which emphasizes the interplay of ability, motivation, and opportunity in shaping behavior, while also recognizing that organizational resources and capabilities must be effectively mobilized, reflecting the principles of the resource-based view.

Moreover, sustaining CEP improvement requires ongoing calibration between short-term operational pressures and long-term environmental goals. Organizations must develop adaptive feedback and recognition systems that monitor performance, reinforce positive behaviors, and enable iterative learning. Embedding sustainability objectives into routine operational and strategic decision-making ensures that environmental performance was continuously guided by both measurable outcomes and behavioral reinforcement mechanisms.

The effective evaluation and guidance framework for CEP in Chinese telecommunication enterprises should integrate measurable environmental indicators, human resource strategies that

foster pro-environmental behavior and innovation, structural process management, and continuous feedback mechanisms. This holistic approach not only captures the multifaceted determinants of CEP but also ensures that corporate sustainability efforts were operationally feasible, strategically coherent, and behaviorally reinforced, thereby supporting long-term environmental performance and competitive advantage.

5.2.1 Discussion on Green Human Resource Management

The analysis of green human resource management (GHRM) in this study highlights its role not merely as a set of formalized practices but as a strategic and integrative approach that shapes employees' environmental attitudes and behaviors. GHRM functions as an organizational mechanism that systematically embeds environmental values into recruitment, training, appraisal, and incentive systems, thereby creating a workforce that internalizes sustainability objectives. This aligns with the perspective of Renwick et al. (2013), who argue that GHRM goes beyond traditional HRM by actively cultivating employee capabilities, motivation, and participation opportunities to achieve environmental outcomes. The findings of this study support the notion that GHRM contributes to organizational performance by establishing structural and cultural conditions that guide employees toward pro-environmental behavior, which was consistent with prior research emphasizing HR practices as a critical driver of sustainability (Jabbour & de Sousa Jabbour, 2016; Dumont et al., 2017).

The qualitative evidence reinforces this view, revealing that the operationalization of GHRM in the surveyed enterprises was multidimensional, encompassing strategic alignment with corporate environmental goals, the integration of sustainability modules into employee development programs, and the application of environmentally oriented performance evaluations. This multidimensional approach ensures that environmental responsibility was not episodic but embedded in daily work practices. Such systemic design resonates with the AMO framework, where ability, motivation, and opportunity interact to shape employee outcomes (Appelbaum et al., 2000; Boxall & Macky, 2009).

However, critical reflection suggests that while GHRM establishes the necessary preconditions for environmental engagement, its effectiveness was contingent upon the specificity and contextual relevance of its practices. Broad or generic green performance indicators may fail to translate strategic objectives into actionable behaviors, and the impact of GHRM may vary across hierarchical levels and departments depending on leadership support and interdepartmental coordination. This limitation echoes the critique by Jackson et al. (2011) that HRM interventions must be contextually tailored to convert policy into observable performance. Additionally, the reliance on formalized practices may

not fully capture the informal and emergent behaviors that drive sustainable performance, indicating a need for complementary mechanisms such as organizational culture cultivation.

GHRM in this study was validated as a fundamental driver of environmental performance within Chinese telecommunication enterprises. It provides both a structural and motivational foundation for employee engagement in sustainability, demonstrating that strategic HR practices can significantly influence organizational outcomes. Nonetheless, its implementation must be nuanced, contextually grounded, and coupled with clear operational metrics to realize its full potential, highlighting both its strengths and boundaries as a mechanism for fostering corporate environmental performance.

5.2.2 Discussion on Green Innovation

In this study, green innovation (GI) was identified as a key driver for enhancing corporate environmental performance (CEP) in Chinese telecommunication enterprises, exhibiting the strongest direct effect among the three examined variables. This underscores the strategic value of green technologies, process optimization, and innovation management in achieving sustainability objectives. The study further revealed that GI encompasses not only the adoption of energy-efficient equipment and network optimization but also cross-departmental collaboration, supplier sustainability assessments, and process improvements, indicating that the implementation of green innovation spans both technological and organizational dimensions, reflecting a multi-layered approach to sustainable practices within complex systems.

From a theoretical perspective, the resource-based view (RBV) provides a solid foundation for understanding the mechanisms through which green innovation influences environmental performance. According to the RBV, green innovation represents a rare, inimitable, and strategically valuable resource that can generate a sustained competitive advantage (Oduro, Kumi, & Mensah, 2021).

The strong direct effect of GI observed in this study supports this assertion, demonstrating that investments in green technology development, operational process optimization, and the establishment of sustainable supply chain evaluation systems enable firms to translate internal resources into measurable environmental outcomes, such as reduced emissions, energy consumption, and waste. This aligns with previous findings by Wolf (2011) and Guo, Chen, and Li (2020), which emphasize that green process innovations were often internally generated, entail higher implementation costs, but yield greater effectiveness (Xie, Huo, & Zou, 2019), highlighting the strategic importance of investing in internal innovation capabilities for long-term performance.

The qualitative analysis further elucidates the operational characteristics of GI. Interviews indicated that enterprises prioritize cross-departmental collaboration and voluntary employee

engagement when implementing green innovation, facilitating the translation of innovative concepts into practice while enhancing organizational members' sense of responsibility and participation. This observation resonates with Huang and Chen (2022), who argued that effective GI implementation requires the integration of internal incentives and organizational coordination mechanisms rather than reliance solely on technological investment.

Nevertheless, several critical considerations emerge. green innovation was typically associated with high costs and risks, and its successful realization depends on adequate resource allocation and strategic integration; without systematic support mechanisms, innovation outputs may fail to sustain or be effectively implemented. Second, as Xie et al. (2019) note, while green process innovations were more effective, they demand high levels of management capability and interdepartmental coordination, suggesting that in large telecommunication enterprises, structural, decision-making, and resource allocation imbalances could constrain the full potential of innovation. Third, although existing measurement scales for GI have been optimized (Fatoki, 2021; Makhloufi, Boumediene, & Benabdellah, 2022), they may still face adaptation challenges in cross-cultural or industry-specific contexts, necessitating localization adjustments for accurate assessment.

This study demonstrates that green innovation plays a strategic and central role in enhancing corporate environmental performance, relying not only on technological investment but also on organizational mechanisms, cross-departmental collaboration, and employee participation. GI, as a resource capable of sustaining competitive advantage, was empirically supported within the RBV framework, and the findings highlight the importance for enterprises to prioritize organizational coordination and institutional support throughout the innovation process to achieve long-term, stable improvements in environmental performance.

5.2.3 Discussion on Organizational Citizenship Behavior

In this study, organizational citizenship behavior (OCB) emerged as a critical factor influencing corporate environmental performance (CEP) in Chinese telecommunication enterprises, functioning both as a direct driver and as a mediator that amplifies the effects of green human resource management (GHRM) on green innovation (GI). Employees' voluntary engagement in environmental initiatives, beyond formal job responsibilities, reflects a proactive internalization of organizational sustainability values. This aligns with Zhao et al. (2019), who found that social responsibility-oriented HRM fosters employees' OCB. The findings suggest that when enterprises embed sustainability principles in recruitment, training, and performance evaluation, employees were more likely to engage in discretionary behaviors that benefit the organization's environmental objectives, consistent with the observations of Pham et al. (2018), who highlighted the role of environmental training in promoting environmental OCB.

From a managerial perspective, OCB facilitates the translation of individual initiative into collective environmental outcomes. Daily et al. (2012) noted that through training and authorization, supervisors and employees can collaborate to implement environmental initiatives, enhancing participation in corporate environmental management and stimulating environmental citizenship behavior. The present study's qualitative evidence supports this view, showing that employees voluntarily form green teams, propose improvements, and participate in energy-saving activities, indicating that organizational mechanisms and culture play a pivotal role in sustaining OCB.

Despite its demonstrated importance, critical considerations arise. Many studies on environmental OCB, including those that rely on secondary or theoretical data (Stanitsas & Kirytopoulos, 2021; Úbeda-García et al., 2021; Wang et al., 2021), point to limitations in available company-level environmental data, often reducing variables to binary indicators. This scarcity highlights the challenge of fully quantifying the impact of OCB on measurable CEP, particularly when cross-industry and longitudinal data were limited. Furthermore, sustaining high levels of OCB may depend on a combination of intrinsic motivation and organizational reinforcement; without consistent recognition, incentives, or a supportive culture, the voluntary behaviors that underpin OCB may wane, potentially limiting their contribution to green innovation and environmental performance.

OCB in this study demonstrates both strategic and operational significance. It acts as a bridge between GHRM practices and tangible environmental improvements, amplifying the organization's capacity for green innovation and environmental management. The findings emphasize that fostering OCB requires not only formal HR practices but also a cultural and structural environment that supports voluntary, proactive engagement in sustainability initiatives. Future research should explore mechanisms to systematically measure and sustain OCB, especially in contexts where empirical environmental data were limited or fragmented.

5.2.4 Discussion on Corporate Environmental Performance

In this study, corporate environmental performance (CEP) emerged as the outcome reflecting the effectiveness of green human resource practices, green innovation, and organizational citizenship behaviors within Chinese telecommunication enterprises. The findings indicate that CEP was influenced both directly by green innovation and GHRM, and indirectly through employees' OCB, highlighting the synergistic interplay between structural and behavioral mechanisms in shaping environmental outcomes. CEP, therefore, represents not merely technical achievements such as reduced emissions, energy consumption, and waste, but also the result of employees' discretionary engagement and the strategic integration of environmental objectives within organizational processes.

This aligns with prior studies in various contexts, which similarly reported positive effects of GHRM, OCB, and green innovation on CEP (Naz et al., 2021; Raza & Khan, 2022; Nassani et al.,

2022; Elshaer et al., 2021; Haldorai et al., 2022; Ahm Ullah et al., 2021), supporting the cross-national relevance of these mechanisms. Critically, while CEP benefits from these practices, its realization in large telecommunication firms depends on systematic coordination across departments, adequate resource allocation, and robust measurement frameworks. Without institutionalized support, technical interventions may not translate consistently into measurable environmental outcomes, underscoring the importance of aligning human, technological, and organizational resources to sustain environmental performance.

CEP in this study illustrates that sustainable performance was contingent on the integration of human capital, innovation capabilities, and employee engagement, demonstrating that strategic and behavioral dimensions jointly drive corporate environmental improvements.

5.3 Recommendation

5.3.1 Strengthening Green Human Resource Management (GHRM) Practices

Human Resource departments should systematically embed environmental awareness and sustainability competencies throughout the employee lifecycle. During recruitment, screening criteria should prioritize candidates with prior exposure to green practices, technical knowledge of energy-efficient systems, or demonstrated commitment to environmental responsibility. Training programs should incorporate modules on green technologies, process optimization, and regulatory compliance, alongside experiential learning activities such as eco-project participation. Performance appraisal and incentive mechanisms should integrate measurable environmental targets, linking individual achievements to corporate environmental performance. By aligning ability, motivation, and opportunity mechanisms, HR departments can cultivate proactive employee engagement in environmental initiatives, fostering organizational citizenship behavior (OCB) and supporting green innovation (GI).

5.3.2 Prioritizing Green Innovation (GI) as a Strategic Driver

Innovation and operations departments should invest strategically in energy-efficient technologies, network optimization, and eco-friendly operational processes. Implementation should be complemented by cross-departmental coordination to ensure that innovation initiatives were effectively executed and knowledge was shared across teams. Incorporating sustainability criteria into supplier evaluation, procurement, and vendor management extends environmental responsibility across the supply chain. Management should provide structured platforms for employees to propose green process improvements and participate in collaborative innovation projects. By institutionalizing

such mechanisms, discretionary green behaviors can be translated into measurable innovations, maximizing GI's contribution to corporate environmental performance (CEP).

5.3.3 Cultivating Organizational Citizenship Behavior (OCB) for Environmental Goals

Management and team leaders should foster an organizational culture that encourages voluntary environmental behaviors. This can include establishing employee-led green teams, suggestion schemes for energy efficiency improvements, and recognition programs that highlight exemplary environmental contributions. Leaders should model pro-environmental behaviors and maintain regular communication on corporate sustainability objectives, enhancing employees' identification with green organizational values. Embedding environmental responsibility into organizational identity ensures that OCB becomes a self-sustaining driver of both process and technological innovations.

5.3.4 Implementing a Comprehensive Environmental Performance Evaluation System

Strategy and environmental management departments should develop an integrated evaluation system that combines quantitative metrics with qualitative indicators capturing employee engagement, cross-departmental collaboration, and adoption of innovative practices. Regular performance reviews, reporting mechanisms, and feedback loops can identify gaps, inform managerial decision-making, and guide resource allocation. Linking evaluation outcomes to incentives and strategic planning ensures that environmental objectives were pursued consistently and embedded in corporate operations without undermining productivity.

5.4 Research Limitation

Despite the valuable insights provided by this research, several limitations should be acknowledged. The study employed a cross-sectional research design, which captures relationships at a single point in time. This limits the ability to infer causal relationships among green human resource management (GHRM), green innovation (GI), organizational citizenship behavior (OCB), and corporate environmental performance (CEP). Longitudinal or panel studies would provide more robust evidence of causal effects and the sustainability of green initiatives over time.

The sample was confined to Chinese telecommunication enterprises, which may limit the generalizability of the findings to other industries or cultural contexts. Differences in regulatory environments, market competition, and organizational structures in other sectors or countries may affect the applicability of the observed relationships.

While the study integrated quantitative survey data with qualitative interview insights, there may still be potential biases in self-reported measures. Employees' responses could be influenced by social desirability or organizational culture, particularly regarding environmentally responsible behaviors. Triangulation with objective performance indicators or multi-source data could enhance reliability. The study focused primarily on GI and OCB as mediators between GHRM and CEP, which may not capture all potential mechanisms. Other factors, such as green leadership, organizational learning, or digital capabilities, could also play significant roles in shaping environmental outcomes. Although the study examined multiple dimensions of GHRM and CEP, the operationalization of constructs may not fully capture all aspects of green practices, particularly in terms of their long-term strategic integration and cross-departmental implementation. Future studies should refine measurement instruments and consider additional contextual variables to provide a more comprehensive understanding.

5.5 Future Research

Based on the findings and limitations of this study, several avenues for future research were recommended. Longitudinal research designs could be employed to examine the dynamic and causal relationships between green human resource management (GHRM), green innovation (GI), organizational citizenship behavior (OCB), and corporate environmental performance (CEP). While this study captured cross-sectional effects, long-term studies would provide insights into how sustained GHRM practices and employee behaviors contribute to incremental and enduring environmental improvements.

Future research could expand the scope beyond Chinese telecommunication enterprises to include other industries or multinational contexts. Such comparative studies would enhance the generalizability of the findings and allow for exploration of how institutional, cultural, and market differences influence the effectiveness of GHRM, GI, and OCB in driving environmental performance. While this study examined GI and OCB as mediators, future studies could explore additional mediating or moderating variables, such as organizational learning, green leadership, or digital capabilities, to capture more nuanced mechanisms linking HR practices to environmental outcomes. Understanding boundary conditions, such as firm size, regulatory pressure, or resource availability, could further clarify when and how these practices were most effective.

Mixed-method approaches that integrate richer qualitative insights, including multi-level or cross-departmental case studies, could deepen understanding of the contextual and cultural factors that shape employee engagement in green practices. This would also help refine measurement scales

for GI and OCB, ensuring they capture both technical and behavioral dimensions in diverse organizational settings. Future research could investigate the long-term sustainability of environmental initiatives, focusing on the cost-benefit trade-offs, resource allocation, and strategic integration of green practices. Such studies would provide practical guidance for managers seeking to balance short-term business pressures with long-term environmental objectives.

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APPENDIX

Appendix A

Questionnaire

Effect of Green Human Resource Management on Corporate Environment Performance Mediated by Green Innovation and Organizational Citizenship Behaviour of Chinese telecom Enterprises in China

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Researcher Ms. Chen Haiyun

Curriculum Doctor of Philosophy in Management, Siam University

This questionnaire was partial fulfillment of the requirements for the degree. The purpose of this study was to examine the relationship between Green Human Resource Management, green innovation, organizational citizenship behavior and Corporate Environment Performance of Chinese telecom Enterprises in China. Your information was kept secret. Should you have any questions or suggestions, please contact me at the following addresses and numbers:

Siam university 38 Petkasem Road, Phasicharoen, Bangkok, 10160 Thailand; Tel 02-867-8000 or No.102 room, A56 Yard, Financial Street, Xicheng District, Beijing City, 100032Beijing China; Tel 18653590269.

This questionnaire had 8 pages and was divided into 5 parts as follows:

Part I: Personal Information

Part II: The level of company managers in Green Human Resource Management

Part III: The level of company managers in green innovation

Part IV: The level of the company's Organizational Citizenship Behaviour

Part V: The level of the company's Corporate Environment Performance

Part VI: Recommendation

<u>Part 1</u> Personal information

Please select the appropriate response for the following.

Please select the appropriate response for the following.

1. What was your gender?

☐ 1) Male ☐ 2) Female ☐ 3) LGBTQ+

2. What was your age? (years old)

☐ 1) 18-30 ☐ 2) 31-40

☐ 3) 41-50 ☐ 4) above 51

3. What was your marital status?

☐ 1) Single ☐ 2) Married

☐ 3) Divorced ☐ 4) Separated

4. What was your education degree?

☐ 1) Under Bachelor ☐ 2) Bachelor or even ☐ 3) Postgraduate

5. What was the average monthly income (Yuan)?

☐ 1) Below 5,000 ☐ 2) 5,001 - 10,000 ☐ 3) 10,001 - 20,000

☐ 4) Above 20,001

6. How long have you been working for your company (years)?

☐ 1) 1 – 3 ☐ 2) 4 – 6 ☐ 3) 6 years or more

7. Which department were you currently in?

☐ 1) Strategic planning ☐ 2) Administration ☐ 3) Human Resources

☐ 4) Sales ☐ 5) Others……. (Specify)

8. Which province was your company located in?

☐ 1) Bei Jing ☐ 2) Shang Hai ☐ 3) Guang Zhou

☐ 4) Others

9. How many employees does your company have?

☐ 1) 300 or less ☐ 2) 301 – 1000 ☐ 3) 1001 or more

10.What was your company total income in 2024? （Yuan）

☐ 1) 10,000 or less ☐ 2) 10,001 – 100,000 ☐ 3) 100,001 or more

Part II: The opinions and attitudes of green human resource management (GHRM)

Please select the performance of your company's managers, in the field of Green Human Resource Management. Check one box for each item.

Strongly Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Strongly Agree
1	2	3	4	5

Item	Contents	Alternative Answer				
		1	2	3	4	5
Green Human Resource Management (GHRM)						
11	At your enterprise, environmental issues were a necessity for job descriptions.					
12	Your firm chooses candidates that were sufficiently knowledgeable about greening to fill open positions.					
13	Recruitment communications incorporate environmental commitment and conduct requirement.					
14	This firm establishes an environment management system and environmental audit.					
15	Your enterprise engages the employee in establishing environmental strategies.					
16	Your firm recognizes employees as essential actors in environmental decisions and initiatives.					
17	Your enterprise provides ecological education to employees promptly and frequently.					
18	Compared to other firm training programs, environmental training was given priority					

Part III: The opinions and attitudes of corporate environmental performance (CEP)

Please select the performance of your company's managers, in the field of corporate environmental performance. Check one box for each item.

Strongly Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Strongly Agree
1	2	3	4	5

Item	Contents	Alternative Answer				
		1	2	3	4	5
corporate environmental performance (CEP)						
19	Your enterprise minimizes the influence of its product and procedures on the environment.					
20	Your firm had switched to a renewable power source and reduced its use of fossil fuel.					

Item	Contents	Alternative Answer				
		1	2	3	4	5
21	Your enterprise had drastically decreased the amount of solid waste it produces.					
22	The current business operations of Your firm were automated.					
23	Your business uses ecologically friendly methods to dispose of waste.					
24	Your firm had mitigated its overall waste, emission, use of toxic and hazardous materials.					

Part IV: The opinions and attitudes of green innovation (GI)

Please select the performance of your company's managers, in the field of green innovation (GI). Check one box for each item.

Strongly Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Strongly Agree
1	2	3	4	5

Item	Contents	Alternative Answer				
		1	2	3	4	5
green innovation(GI)						
25	Your enterprise had enhanced environmentally friendly packaging for both used and new product line.					
26	Your enterprise produces goods and offers services while taking ecological considerations into mind.					
27	Your enterprise uses modern technology to neutralize pollution					
28	Your enterprise uses repurposed and recycled materials when providing services to consumers.					
29	Your enterprise was better able to meet the needs of its customers by lowering emissions of harmful substances and pollution					

Part V: The opinions and attitudes of organizational citizenship behavior (OCB)

Please select the performance of your company's managers, in the field of organizational citizenship behavior (OCB). Check one box for each item.

Strongly Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Strongly Agree
1	2	3	4	5

Item	Contents	Alternative Answer				
		1	2	3	4	5
organizational citizenship behavior (OCB)						
30	Before doing something that may affect the environment in my work, I will weigh the consequences of your actions.					
31	In your daily work, I voluntarily implement environmental protection actions and initiatives.					
32	You suggest to your colleagues how to protect the environment more effectively, even if It was not your responsibility.					
33	You participate in environmental activities organized by your company.					
34	You keep yourself informed of the company's environmental protection initiatives.					
35	You take environmental protection actions that contribute positively to the image of our company.					
36	You voluntarily participate in projects or activities that address environmental issues in your company.					
37	You spontaneously spend time helping your colleagues to consider the environment in everything they do at work.					
38	You encourage my colleagues to adopt more environmentally friendly behaviors.					
39	You encourage my colleagues to express their thoughts and opinions on environmental issues.					

Part VI: Recommendation was on the next page

Please go to next page.

Part V: Recommendation

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THANK YOU FOR YOUR TIME AND PARTICIPATION

Appendix B

Interview Form

Effect of Green Human Resource Management on Corporate Environment Performance Mediated by Green Innovation and Organizational Citizenship Behaviour of Chinese Telecom Enterprises in China

Researcher Ms. Chen Haiyun

Curriculum Doctor of Philosophy in Management, Siam University

Instruction:

1. Interviewees were company managers, government officers and experts.
2. All participants were requested to sign the consent form.
3. The purpose and nature of the study was explained to participants prior to do the interview and participants had opportunity to ask questions about the study.
4. All participants' rights for the interview were listed in the consent form.
5. Your information was kept secret. Without your permission, your identity, any related persons, and organization names will remain anonymous.
6. 14 questions were asked to collect information from participants
7. The interview was most benefit to the research. Therefore, participation of all participants was highly appreciated.

Consent Form

Effect of green human resource management on corporate environment performance mediated by green innovation and organizational citizenship behaviour of Chinese telecom enterprises in China

I, ……..……..……..…… voluntarily agree to participate in this research study.

- I understand that all information I provide for this study was treated confidentially.
- I agree to my interview being audio-recorded.
- I understand that even if I agree to participate now, I can withdraw at any time or refuse to answer any question without any consequences of any kind.
- I understand that I can withdraw permission to use data from my interview within two weeks after the interview, in which case the material was deleted.
- I understand that participation involves **Chinese telecom enterprises in China**.
- I have had the purpose and nature of the study explained to me in writing and I have had the opportunity to ask questions about the study.
- I understand that I will not benefit directly from participating in this research.
- I understand that in any report on the results of this research my identity will remain anonymous. This was done by changing my name and disguising any details of my interview which may reveal my identity or the identity of people I speak about.
- I understand that disguised extracts from my interview may be quoted in dissertation, conference presentation, and published papers.
- I understand that if I inform the researcher that myself or someone else was at risk of harm, they may have to report this to the relevant authorities - they will discuss this with me first but may be required to report with or without my permission.
- I understand that signed consent forms and original audio recordings was retained in Siam University, Thailand by the researcher until the exam board confirms the results of researcher’s dissertation.
- I understand that a transcript of my interview in which all identifying information had been removed was retained for two years from the date of the exam board.

- I understand that under freedom of information legalization I am entitled to access the information I have provided at any time while It was in storage as specified above.
- I understand that I am free to contact any of the people involved in the research to seek further clarification and information.

Researcher name: Ms. Chen Haiyun

Degrees: Doctor of Philosophy in Management

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Signature of research participant

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Signature of participant Date

Signature of researcher

I believe the participant was giving informed consent to participate in this study.

Chen Haiyun ----------

Signature of researcher Date

Date of interview:_____ Time: _____

Part I: Personal Information

1. Organization name_____

2. Participant name_____

3. Contact address _____

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4. Organization information

4.1 Which company was you work in?_

_____

4.2 How many employees does your company have?

_____

4.3what was your company total income in 2024?

_____

5. Participant information

5.1 What was your gender? ☐ 1) Male ☐ 2) Female ☐ 3) LGBTQ+

5.2 What was your age?

_____

5.3 What was your education degree?

_____

5.4 Number of years working with the organization

_____

5.5 Which department were you currently in?

_____

Part II: Opinion on green human resource management

1. Can you provide your opinion for the statistical Analysis of Green Human Resource Management?

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Part III: Opinion on green innovation

2. Could you please talk about the important role of green innovation?

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Part IV: Opinion on Organizational Citizenship Behaviour

3. Could you please talk about the important role of Organizational Citizenship Behaviour? Why?

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Part V: Opinion on the relationship between Corporate Environment Performance

1. Could you please talk about the important role of Corporate Environment Performance? Why?

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Part VI: Recommendation

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AUTHOR'S BIOGRAPHY

Name and surname Chen Haiyun

Work Experience

1995 - 2015	China Unicom Yantai Branch, Shandong Province
2015 - 2017	International Business Department of China Unicom Group Corporation
2017 - Curren	Marketing Director, China Unicom International Limited

Education

Bachelor's Degree

Degree	B.B.A.
Major	Business Administration
Institution	Yantai University
Country	China
Year	1993 - 1997

Master's Degree

Degree	M.B.A.
Major	Business Administration
Institution	Shandong University of Science and Technology
Country	China
Year	2010 - 2012

Publishing Research

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