

Article

Examining Effect of Green Transformational Leadership and Environmental Regulation through Emission Reduction Policy on Energy-Intensive Industry's Employee Turnover Intention in China

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Abstract: This study explored a theoretical model of factors affecting employee turnover intentions in the energy-intensive industry from the perspective of environmental regulation through emission reduction policy. Moreover, we examined whether green transformational leadership has a negative effect on the perception of turnover risk of energy-intensive corporate employees and their turnover intentions; we collected data on 531 employees in the energy-intensive industries in China. Data analysis was conducted using exploratory factor analysis, reliability and validity analysis, stepwise regression model analysis, and a structural equation model to test the research hypothesis. The results revealed that environmental regulation through emission reduction policy has a significant impact on employee perception of turnover risk and turnover intention in energy-intensive industries in China. The perception of turnover risk has a greater effect on the turnover intention among employees than the emission reduction policy. Moreover, we found that the perceived risk of turnover has a mediating effect in the relationship between environmental regulation through carbon emission reduction policy and turnover intention. However, green transformational leadership has an inhibiting effect on the perception of turnover risk and turnover intention among employees. This research has crucial theoretical significance for the transformation of energy-intensive enterprises and promoting the sustainable development of energy-intensive enterprises in China.

Keywords: emission reduction policy; green transformation leadership; energy-intensive industry; employee turnover



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1. Introduction

Climate change has gained much attention from the international community. Many scholars, domestic and abroad, have begun to research low carbon policy, carbon emission taxes, and carbon trading issues to reduce carbon emissions [1,2]. China is now in a transition period of restructuring to promote economic growth. The focus of supply-side reform is on energy-intensive industries. Energy-intensive industries consume large amounts of energy and cause severe environmental pollution [3,4]. Following this context, many scholars have focused on localizing China's energy transformation issues for policymakers, for instance, climate change policy and innovation, and environmental technical efficiency [5,6]; the development of renewable energy and environmental innovation while reducing carbon emissions and increasing environmental efficiency and environmental performance [7,8]; and increasing environmental total factor productivity [9].

Some scholars pointed out environmental regulation's positive effects on the development of green transformation [6]. Some studies showed that environmental regulation

through emission reduction policies can influence energy-intensive corporate sustainable development and organizational effectiveness [10]. However, some energy-intensive companies did not successfully transform [11]. This caused the high employee turnover rate in the energy-intensive industry, and negatively affected the energy-intensive corporate performance. The research progress on employee management in energy-intensive industries from China was not considered [12].

Hom et al. observed a lack of research on energy industry employee turnover [12]. Moreover, previous research focused more on the relationship between organization-related factors and related psychological factors with employee turnover intention [12–14]. In addition, researchers have discussed human resource management with state-owned enterprise reform in China; however, there are a few studies about energy industry employee turnover during energy transitions [15–20]. There are also a few studies about the effect of turnover risk perception on turnover intention among employees. Moreover, a few studies considered that the individual control variable, individual age, working experience, company size or education level may have an effect on turnover in energy-intensive industries. The theoretical implication of sustainability is lacking in the energy-intensive sector during industry transformation in a developing country; moreover, much of the employee turnover in energy-intensive companies negatively affect their operation and sustainability.

This present research explores the influencing factors for employee turnover intention in the energy-intensive industries to address these research gaps. This present research conducts the stepwise regression model analysis with individual control variables, types of company variables and structural equation modeling for testing the influencing factors for turnover intention among employees in energy-intensive companies. It examines the perception of turnover risk mediating emission reduction policy and turnover intention in the energy-intensive industries, thus, revealing the mechanism of determining factors affecting turnover behavioral intention. We also explore whether green transformational leadership has a negative effect on employee turnover intention. From the perspective of Chinese energy structure transformation, this study identifies the important factors of employee turnover intentions in the energy-intensive industries. It reveals the mechanism of carbon emission policy affecting employee turnover intentions in the energy-intensive industries. This mechanism serves as an essential theoretical implication for prompting sustainable, energy-intensive industries in China.

This present paper is framed as follows: Section two clarifies the theory and hypothesis development and research model; Section three provides the research methodology, which includes the data collection and data analysis as well as the hypothesis testing results; and Section four provides conclusions and recommendations.

2. Literature Review and Hypothesis Development

2.1. Green Transformational Leadership

The concept of transformational leadership was first developed by James Downton. James Macgregor Burns proposed the concept of transformational leadership, and Bernard Bass extended Burns' transformational leadership theory [21,22]. In Burns' study of political leadership, transformational leadership influencing employees to "achieve something of significance and morally uplift them" also means that leaders and followers affect each other by increasing one another's motivation and morality to a higher level, that is, the transformational leader motivates employees to achieve organizational goals by raising employee awareness and influencing employees to look beyond self-interest and achieve a higher level of morality, aiming for a higher level on the Maslow hierarchy of needs. Burns' theory of transformational leadership is also about nurturing followers to be future leaders. Bernard Bass expanded and applied transformational leadership to organizational-related studies [21,22].

According to Bass' research, transformational leadership has an impact on employees. These leaders gain admiration and respect from their employees because of the four factors that comprise idealized influence, inspirational motivation, individualized consideration,

and intellectual stimulation [23]. Idealized influence refers to a leader who possesses a charismatic quality, making them a role model for their employees. Inspirational motivation refers to how transformative leaders provide a clear plan and vision for their employees so that they are motivated to achieve the desired result. Individualized consideration refers to how leaders treat their employees as individuals, taking their attributes, such as needs, abilities and personal goals, into consideration. This means that transformational leaders focus on organizational objectives and goals, not neglecting employees' individual needs. Hence, leaders also act as coaches and guides, training employees to develop essential qualities to achieve organizational goals. Lastly, intellectual stimulation means that transformational leaders stimulate employees to be innovative and creative in their problem-solving skills. Bass' theory and his development of the Multifactor Leadership Questionnaire set the foundation for Chen and Chang's study in which they proposed "leader's behavior that motivates and encourages employees to achieve environmental goal" as green transformational leadership [24].

In this present research, we explore the role of green transformational leadership in China's energy-intensive enterprises during the transformation process. Green transformational leadership, derived from the concept of transformational leadership, can be defined as the action taken by the leader that delivers a clear vision, inspiration, motivation, and support to employees in the company while fulfilling environmental goals [25,26]. Other than that, Chen and Chang refer to green transformational leadership as the "leader's behavior that motivates employees to achieve environmental goals and inspire them to perform better than expected environmental performance" [27].

A green transformational leader influences employees by following the four factors of transformational leadership. These leaders are role models for their employees and subordinates. With green transformational leadership, employees are provided with a detailed plan; thus, they are aware of the strategy to achieve the vision and goal of attaining the expected environmental performance [27]. The employees are aware of their role and responsibility within the organization, and the motivation and inspiration from the leader make them excited to perform beyond expectations. One important characteristic is that green transformational leaders also stimulate followers to adopt innovation and creativity in their problem-solving skills. Hence, more innovative and creative solutions can be provided in transforming energy-intensive industries, such as environmental or low-carbon innovation [28]. Chinese energy-intensive industries must pay attention to the social trend of reducing environmental damage and creating sustainability. Under the pressure of the emission reduction policy, these industries deem low carbon transformation to be the solution to their problem [2].

2.2. Factors Influencing Employee Turnover Intention

According to the research of Hom et al., the influencing factors for employees' turnover intentions can be summarized as external and internal organizational and leadership behavior related factors, and individual psychological factors for employee turnover [12]. The external variables discussed in this paper refer to the following: external by competition, external job market opportunity, external alternative employment, expected utility of alternatives, such as predictability of income growth, and comparison of other options to present job compensation and family responsibilities [28–30]. External competition is generally comprehended as industry competition intensity. The more competitive the industry, the higher the turnover rate because employee stress can influence the employee turnover intention. For example, Mobley et al. proposed that external employment opportunities and the predictability of reward can affect employees' turnover intentions [28]. Laker suggested the role of perceptions of employment opportunities for turnover behavior [29]. Zhang indicated that the perception of external employment opportunities, potential benefits of changing jobs, higher salaries, and welfare of education of the next generation could create substantial prospective economic benefits for employees that can influence employee turnover in underdeveloped areas [30].

Internal organizational or leadership behavior-related factors refer to organizational training, compensation systems, organizational culture, internal service quality, leadership behavior, and other variables that affect turnover intention [31–33]. For example, Zhang researched private companies' managers to explore the reasons for the sales managers turnover in private companies in Guangdong and revealed that the main reasons were job compensation and the companies' development prospects [34]. Liu et al. determined that the key factor that affects employees' turnover intentions in state-owned companies is job compensation [35]. Nazir et al. and Heneman and Judge proposed a compensation system in which salary can improve employee job satisfaction [36,37]. Egan et al. identified that learning culture has an indirect impact on employee turnover; therefore, they proposed that an organizational learning culture can enhance employee satisfaction and reduce the employees' turnover intentions [38]. Li et al. and Chan et al. focused on service employees, revealing the impact of internal service quality on employee work stress and service performance [39,40]. Fournier et al. suggested that the ethical climate plays a critical role in a sales company [41]. Karatepe et al. presented that the service industry employees' psychological capital plays a moderating role in work–family conflicts and turnover intentions [42]. Yang et al. proposed that organizational fairness affects the job satisfaction and turnover intentions of state-owned railway employees [43]. Tan et al. pointed out that organizational support has an impact on employees' turnover intentions. In the employee turnover research, leadership-related factors also can predict organizational commitment, satisfaction and turnover intention [13]. Individual psychological factors refer to the research on the influence of psychological factors' negative emotions, work stress and anxiety, burnout, turnover risk perception, and other variables on employee turnover intention. According to previous studies, job stress, anxiety, and burnout have negative effects on turnover intention, as these variables negatively affect employee satisfaction and commitment [39,40].

2.3. Factors Influencing Energy-Intensive Industry Employee Turnover

China's energy-intensive enterprises were the main targets of the supervision and disclosure of pollution information after the Paris Agreement. China's government introduced a series of emission reduction policies and carbon trading and tax for energy-intensive enterprises [3,4]. On the other hand, these companies also get extensive supervision from media reports, public supervision and government agencies. Following this context, China's economic development is restructuring and promoting new development modes for low carbon and green, high-quality transformation. The high energy consumption industries' supply-side mainly includes thermal power, cement, coal, steel, chemical, and paper enterprises because of increased coal consumption and severe environmental pollution. Therefore, emission reduction policies for energy-intensive enterprises have been issued, which include reducing carbon consumption, controlling carbon use, and the tax of carbon emissions. According to the previous research findings, carbon emission reduction would negatively affect corporate financial performance and corporate values, such as Tobin's Q [44,45]. According to the report, between 2015 and 2016 alone, the thermal power industry's profit dropped from CNY 88.2 billion yuan to CNY 36.7 billion. Many energy companies have increased their debt ratios. This has affected energy-intensive companies' performance and decreases employee incomes (eg., compensation, bonus, and reward).

The policy of carbon emission reduction affects corporate performance, which also decreases corporate employee incomes. When an enterprise's financial performance declines in the short-term and the company meets economic difficulties, the company will lay off its employees [46]. Moreover, Linz and Semykina researched employees' perceived job instability during Russia's transition from plan to market economics. Job instability has two comments: one is about the workers' concerns about job loss, and the second evaluates their concern about the ability to find employment in case of a lay-off [47].

The early study defined that risk as a weighted combination of the uncertainty probability and a judgment of the severity of loss [48]. According to Slovic, the proposed

perception of risk is quantifiable and predictable; it is referred to as a belief about the potential risk or the possibility of loss and, similarly, the individual's judgments and evaluations of the hazards to them. Fischhoff et al. proposed the risk definition. Risk is the main topic in the management of many technologies. The degree to which the risk evokes a feeling of dread for the risk index and the risk reflects the degree to which the risk is unknown for decision making. The perceived risk can come from the utility of a product's function, physical health or environment [49]. It is a subjective judgment that people make about the characteristics and severity of a risk. Vardaman et al. proposed that when employee perceive high risk with turnover intention, compared with low-risk perceptions, a lower turnover rate with turnover intentions was found among employee in organization studies [50]. Allen et al. also proposed that the perceptions of the risk associated with turnover play an essential role in turnover decisions [51]. Based on the above analysis, the environmental regulation of the emission reduction policy can affect energy-intensive corporate economic performance, which decreases employee income. As this may affect employee job-seeking behavior and even affects the employee turnover rate, we propose that the carbon emission reduction policy can influence organizational sustainability or even bankruptcy [44,45]. The sustainable development of enterprises affects the welfare of employees and their future development. Additionally, the carbon emission reduction policy can affect work turnover risk perceptions and turnover intentions among employees in energy-intensive industries. Thus, we propose the following hypotheses:

Hypothesis 1. *The environmental regulation through the emission reduction policy has a positive effect on employees' turnover risk perceptions.*

Hypothesis 2. *The environmental regulation through the emission reduction policy has a positive effect on employees' turnover intentions.*

Hypothesis 3. *The turnover risk perception mediates the mechanism between environmental regulation through the emission reduction policy and employees' turnover intentions in energy-intensive industries.*

2.4. Green Transformational Leadership and Employee Turnover

The green transformational leader is influential for energy-intensive industries moving toward high-quality development, especially with the pressure from government regulations. To raise environmental awareness among employees, the green transformational leader is the role model to the employees, performing environmental innovation and stressing the importance of low carbon innovation. When employees are aware of the issue, they are more open-minded and willing to participate when a transformation plan is announced [25]. The green transformational leader can encourage employees to develop environmental innovation and achieve the environmental goal to accomplish the organization's transformation target. Thus, this will reduce employees' worries and uncertainty about the enterprise's future development and promote green low carbon transformation [3,25,26].

Moreover, green transformational leaders can ensure that the whole organization is working toward achieving the same goal. This is important in a corporation, as every member must cooperate and contribute their expertise to achieve the transformation project or achieve the common environmental goal of green transformation. The green transformational leader is a role model to their employees with an organizational goal and vision; thus, they are aware of the strategy to achieve the vision and goal of attaining the expected environmental performance [27]. One important characteristic is that green transformational leaders also stimulate employees to adopt innovation and creativity in their problem-solving skills. Hence, more innovative and creative solutions can be provided in transforming energy-intensive industries, such as energy-saving technology innovation or low-carbon innovation [3,27]. Besides encouraging employees to achieve environmental goals, green transformational leaders also encourage employees to be innovative and

creative while completing their tasks. More new ideas emerge by regularly stimulating employees to consider green concepts and green ideology, pushing new environmental innovation. This is important for energy-intensive industries to achieve energy transformation. Through the deployment of new innovation, these industries might create sustainable performance by lowering their damage to the environment.

In addition, we propose that another essential quality of a green transformational leader is having a long-term, environmental vision. Environmental innovation or low carbon transformation cannot deliver results in the short term. These kinds of projects usually require a long time-frame, from months to years, before the organization can reap the utility from these long-term environmental and transformation projects. Thus, the long-term vision of green transformational leaders to plan and wait patiently to witness the results delivered by these projects is necessary. Furthermore, this kind of project is time consuming, and requires significantly advanced knowledge and technology to develop these innovations to reduce energy consumption and emissions. Therefore, having a long-term vision helps the leader to plan different objectives to contribute to a successful, low carbon transformation, ultimately [52,53].

Moreover, teamwork is essential to urge employees to work toward a common goal. Green transformational leaders provide a blueprint for future development with a detailed environmental plan for the employee. Employees need to realize their role in the attempt for low carbon transformation of energy-intensive industries to have the motivation to participate [54,55]. Green transformational leaders are essential to an organization's future development by raising employee motivation levels toward the transformation and improving their work efficiency [56]. According to previous study findings, environmental organization employees are happier, motivated, and willing to carry out R&D for innovation [57]. Hence, green transformational leadership may have an impact on job satisfaction, which affects employee turnover rate.

Based on the above discussion, green transformational leadership enhances environmental innovation performance in energy-intensive enterprises. Green transformational leadership positively impacts green creativity and green product development [24]. Similarly, Mittal and Dhar also explored green transformational leadership's relationship to organization identity. Their results suggest that green transformational leadership positively influences the employee's green organization identity [26]. Chen and Chang investigated green transformational leadership and green performance in Taiwan's electronic companies. Their findings indicate that green transformational leadership positively affects environmental performance through green mindfulness and green self-efficacy [24]. Singh et al. investigated green innovation's effect on SMEs' environmental performance in the manufacturing sector in the UAE by examining green transformational leadership and green human resource management. Their findings suggest that green transformational leadership has a positive effect on green innovation and leads to positive corporate environmental performance [25].

These findings show that green transformational leadership plays an essential role across different industries to directly or indirectly affect environmental innovation and lead to positive environmental performance. Previous studies have stressed the importance of green transformation leadership in encouraging employees to consider green concepts, be creative, and practice green innovation [24,58]. Moreover, researchers suggest that green transformational leadership can achieve corporate environmental performance for sustainable development [59]. Based on the above literature, this paper suggests that green transformational leadership is an essential role for improving enterprise performance and reducing the perceived risk of employee turnover intentions and turnover, affecting energy-intensive companies and their low carbon transformations.

Hypothesis 4. *Green transformational leadership negatively affects employees' turnover risk perceptions in the energy-intensive industry.*

Hypothesis 5. Green transformational leadership negatively affects employees' turnover intentions in the energy-intensive industry.

2.5. Research Model

According to the above discussion, the research model is proposed as the following. We investigated the theoretical hypothesis model as the effects of the emission reduction policy on the perception of turnover risk and turnover intention among employees in an energy-intensive industry. ti means energy-intensive industry' employee turnover intention, crp refers to the emission reduction policy, ptr implies the perception of turnover risk, gtl represents green transformational leadership, r means control variables, α represents constants, and μ represents the unobserved variables. The model is as follows:

$$ti_1 = \alpha_{10} + \beta_{11}crp + \beta_{12}r + \mu_{13} \quad (1)$$

$$\text{mediation ptr}_2 = \alpha_{20} + \beta_{21}crp + \beta_{22}r + \mu_{23} \quad (2)$$

$$ti_3 = \alpha_{30} + \beta_{31}crp + \beta_{32}ptr + \beta_{33}r + \mu_{34} \quad (3)$$

Moreover, we explored the role of green transformational leadership in the relationship among the emission reduction policy with the perception of turnover risk and turnover intention, to be more specific, to explore if green transformational leadership negatively affects employees' perceptions of turnover risk and if green transformational leadership can reduce employee turnover intentions. If green transformational leadership negatively affects the mechanism among the emission reduction policy and employee turnover intentions, then to promote the sustainability of energy-intensive enterprises, the model is as follows:

$$ti_4 = \alpha_{40} + \beta_{41}crp + \beta_{42}ptr + \beta_{43}r + \mu_{44} \quad (4)$$

$$\text{mediation ptr}_5 = \alpha_{50} + \beta_{51}crp + \beta_{52}gtl + \beta_{53}r + \mu_{54} \quad (5)$$

$$ti_6 = \alpha_{60} + \beta_{61}crp + \beta_{62}ptr + \beta_{63}gtl + \beta_{64}r + \mu_{65} \quad (6)$$

3. Methods

3.1. Sampling and Procedure

The survey designed for this research includes two sections. Section one comprises gender, marriage, type of industry, age, education, income level, company size, location, and job experience. In Section 2, the employees who form the energy-intensive enterprise were asked to read questions and determine their degree of agreement. The questionnaire items used in this study were developed and adapted based on the literature review. We conducted a prior survey for checking the understanding of each measurement variables. We invited 15 managers from the energy-intensive industry and 6 relevant field scholars to improve the reliability and validity of the evaluating scale and measurements and to review and modify the questionnaire to explore the factors affecting the employees' turnover intentions in the energy industry. A formal questionnaire survey was conducted with 25 managers from each energy-intensive industry and 8 local government officials in Beijing, Heibei, Tianjin, Jiangsu, Shandong, Liaoning, Jilin, Shanxi, Guangzhou, Shanghai Kunshan, Neimenggu, Chongqing, Xinjiang and Anhui, etc. Samples from large companies, such as those in the thermal power, iron, steel, construction, coal, transportation, pharmaceutical and chemical fertilizer industries, were collected randomly. The questionnaires were distributed to the employees who form the energy-intensive industry in China. Out of the 600 questionnaires distributed, 543 were collected. After deleting invalid questionnaires, we used 531 valid data for our empirical analysis, representing an 88.5% validity rate.

According to the demographic analysis results, we can see that respondents (72.3%) are males and only a few respondents (27.7%) are females. Married respondents are greater than not married families (73.8% and 26.2%). According to the different ages, we can see that 151 respondents (28.4%) are under 29 years old, 312 respondents (58.8%) are

under 30–39 years old, and 68 respondents (12.8%) are under 40 years old. According to the education level, 55 respondents (10.4%) and 111 respondents (20.9%) and 158 respondents (29.8%) are, respectively, high school graduates, 3-year college graduates, and 4-year university graduates. A total of 151 respondents (28.4%) and 56 respondents (10.5%) hold masters and Ph.D. degrees.

According to the different income levels, we can see that 48 (9%) respondents earn less than RMB 5000 monthly, 156 (29.4%) respondents earn between RMB 5001 and RMB 8000, 165 (31.1%) respondents earn between RMB 8001 and 11,000, 120 (22.6%) respondents earn between RMB 11,001 and 14,000, and 42 (7.9%) respondents earn over RMB 14,001. Among the different company areas, responses (48.0%) are from the east area, followed by central residents (39.9%) and west residents (12.1%).

According to the different company size, we can see that under 40 (7.5%) respondents are from 1–499-employee companies, 66 (12.4%) respondents are from 500–999-employee companies, 210 (36.9%) respondents are from 1000–1499-employee companies, 210 (39.6%) respondents are from 1000–1499-employee companies, 55 (10.4%) respondents are from 1500–1999-employee companies, and 160 (30.1%) respondents are from over-2000-employee companies. According to job experience, we can see that respondents with more than 5 years but less than 10 years are the highest in the sampling (46.1%), followed by more than 1 year but less than 5 years (42.2%), more than 10 years but less than 15 years (7.5%), and over 15 years (4.2%). The demographic characteristics of the respondents are summarized in Table 1.

Table 1. Demographic characteristics.

Measurements	Types	Numbers	Percentage
Gender	Female	147	27.7
	Male	384	72.3
Marriage	Married	392	73.8
	Not married	139	26.2
	Iron or steel	84	15.8
Type of industry	Construction	91	17.1
	Mining or oil energy industry, thermal power	149	28.2
	Transportation industry	159	29.9
	Pharmaceutical or chemical Fertilizer industry	48	9.0
Age	29 and under	151	28.4
	30–39 years	312	58.8
	40 and above	68	12.8
Education	High school	55	10.4
	3–years college	111	20.9
	4–years university	158	29.8
	Master’s degree	151	28.4
Income level	Ph.D.	56	10.5
	Less than RMB 5000 monthly	48	9.0
	Between RMB 5001 and 8000	156	29.4
	Between RMB 8001 and 11,000	165	31.1
	Between 11,001 and 14,000	120	22.6
Company size	Over RMB 14,001	42	7.9
	1–499 employees	40	7.5
	500–999 employees	66	12.4
	1000–1499 employees	210	39.6
	1500–1999 employees	55	10.4
Location	Over 2000 employees	160	30.1
	East area	255	48.0
	Central area	212	39.9
Job experience	West area	64	12.1
	More than 1 year but less than 5 years	224	42.2
	More than 5 years but less than 10 years	245	46.1
	More than 10 years but less than 15 years	40	7.5
	Over 15 years	22	4.2

3.2. Measures

The measurements of each research concept is based on previous research, such as environmental regulation through the carbon emission reduction policy, turnover risk perception, green transformational leadership, and turnover intention [10,25,43–45,51].

Environmental regulation through a carbon emission reduction policy was measured by using four items' versions of the scales. The example items are as follows: "For energy intensive enterprises, government implemented specified energy conservation and emission reduction policy"; "For energy intensive enterprises, the government supervised specified policies on coal consumption usage"; "For energy intensive enterprises, government implemented carbon emission trading"; and "For energy intensive enterprises, the government implemented furthers taxation of carbon emissions".

Turnover risk perception was measured by using four items' versions, including "Please indicate how often, after the implementation of emission reduction policies, I worried about this job further"; "In the past 1 year, I have worried and uncertainty about this job"; "I have often concerned about this job's further"; "I have been perceived the risk of loss job".

Green transformational leadership was measured by using five items: "Our organizational leader has a long-term ideal environmental vision"; "Our organizational leader provides a clear environmental plan to follow"; "Our organizational leader encourages employees to achieve environmental goals"; "Our organizational leader stimulates employees to think about green ideas"; and "Our organization leader encourages employees to achieve low carbon innovation".

The turnover intention was measured by using three items. The example items include the following: "In the past 6 months to 1 year, I have been often looking for a new job opportunity"; "I am planning to leave my current company within 6 months or 1 year"; and "I do not have an intention for a long-term work in this company".

All variables used a 5-point Likert (from 1 = strongly disagree to 5 = strongly agree). In total, we developed 16 items for testing our research concept.

3.3. Data Analysis Technique

In this present study, we firstly conducted the descriptive statistics and correlation analysis by using STATA 13.0. Correlations between variables were tested to confirm the direction of the research hypothesis, and, secondly, through the reliability and validity analysis to confirm the consistency and stability of each research concept. Thus, the principal components method and reliability analysis were implemented by using STATA 13.0. Thirdly, we conducted the confirmation factor analysis for testing the validity of each research variable and research model by using AMOS 18.0. Fourthly, the hypothesis testing was conducted with the stepwise regression model analysis and structural equation model by using AMOS 18.0 and STATA 13.0. Furthermore, in order to test the robustness and heterogeneity of the research findings, we also conducted the multiple regression and stepwise regression model analyses, according to the difference level of the heterogeneity of individuals and organizations by using STATA 13.0.

4. Empirical Analysis

4.1. The Results of Descriptive Statistics and Correlation Analysis

We firstly conducted a descriptive statistics and correlation analysis by using STATA 13.0. Environmental regulation through carbon emission reduction policy (crp) has a positive correlation with employees' turnover risk perception (ptr) ($r = 0.277, p < 0.01$) in energy-intensive enterprises. Environmental regulation through a carbon emission reduction policy also has a positive correlation with employees' turnover intentions (ti) ($r = 0.316, p < 0.01$) that is consistent with the expected direction of our alternative hypothesis. In addition, the turnover risk perception has a positive and significant correlation with employees' turnover intentions (See Table 2).

Table 2. The results of descriptive statistics and correlation analysis among each variable.

	1	2	3	4	5	6	7	8	9	10	11	12	13
crp1	1.000												
ptr2	0.277 ***	1.000											
gtl3	0.278 ***	−0.350 ***	1.000										
ti4	0.316 ***	0.620 ***	−0.255 ***	1.000									
gender5	0.089 **	0.054	0.001	0.024	1.000								
marriage6	−0.074 *	−0.086 **	−0.061	−0.116 ***	−0.014	1.000							
industry7	0.062	0.0306 ***	−0.226 ***	0.400 ***	−0.052	−0.099 **	1.000						
age8	0.082 *	−0.072 *	0.133 ***	−0.006	0.027	−0.291 ***	0.048	1.000					
education9	0.105 **	0.323 ***	−0.238 ***	0.432 ***	−0.024	−0.015	0.224 ***	−0.175 ***	1.000				
income10	0.108 **	0.242 ***	−0.091	0.333	0.071	0.104	0.189	0.115 ***	0.171 ***	1.000			
size11	−0.069	0.012	−0.028	0.001	−0.123 ***	0.200 ***	−0.085	−0.241 ***	0.100 **	−0.058 ***	1.000		
location12	0.088	0.013	0.027	0.101	0.048	0.069	−0.241	−0.114	−0.119	0.105	0.082	1.000	
experience13	0.051	−0.026	0.080*	−0.049	−0.078 *	−0.508 ***	0.111 **	0.613 ***	−0.132 ***	−0.069	−0.231 ***	−0.283	1.00
mean	3.47	3.24	2.72	3.43	1.28	1.26	2.99	1.84	3.08	2.91	3.43	1.64	1.73
sd	0.63	0.78	0.72	0.70	0.45	0.44	1.21	0.62	1.15	1.09	1.25	0.69	0.77
Max	5	5	5	5	2	2	5	3	5	5	5	3	4

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

The green transformational leadership has a negative correlation with turnover intention ($r = -0.255$, $p < 0.01$). However, the level of education and the type of industry are positively correlated with the turnover intention. However, the job experience level is negatively associated with the turnover risk perception. In addition, the type of industry is negatively correlated with green transformational leadership. By comparison, environmental regulation through a carbon emission reduction policy has the most significant turnover risk perception, followed by education and income. However, the levels of age and marriage have a negative relationship with the turnover risk perception (See Table 2).

4.2. The Results of Validity and Reliability

To verify the variables' reliability and validity of important factors for employees' turnover intentions in the energy industry based on environmental regulation through a carbon emission reduction policy perspective, we accordingly conducted an exploratory factor analysis through using the principal components method and varimax rotation. As shown in Table 2, we assessed the results using specific minimum standards: all loading coefficients were more significant than 0.5. The ration of the four factors' cumulative variance is 74.06%, and the results are shown in Table 2. A total of 16 measurements were retained and 4 factors were extracted: environmental regulation through carbon emission reduction policy (4), turnover risk perception (4), green transformational leadership (5), and employees' turnover intentions (3) (see Table 3).

Furthermore, the Cronbach's α coefficient test was used to test the reliability of the variables, and results are shown in Table 2: the alpha coefficient of environmental regulation through an emission reduction policy was 0.872, the perception of turnover risk was 0.926, green transformational leadership was 0.898, and turnover intention was 0.850. All values were higher than the standard weight of 0.70. Therefore, we can see that the research variables have good reliability and validity (see Table 3).

Table 3. The results of exploratory factor analysis and reliability.

Research Concepts and Measurements	Cronbach's Alpha	1	2	3	4
Carbon emission reduction policy (Variance = 23.68%)					
[1] For energy intensive enterprises, government implemented specified energy conservation and emission reduction policy	$\alpha = 0.872$	0.082	0.092	0.859	0.109
[2] For energy intensive enterprises, the government supervised specified policies on coal consumption usage		0.194	0.226	0.718	0.108
[3] For energy intensive enterprises, government implemented carbon emission trading		0.124	0.121	0.745	0.149
[4] For energy intensive enterprises, government implemented furthers taxation of carbon emissions		0.180	0.031	0.856	0.083
Turnover risk perception (Variance = 18.72%)					
[1] Please indicate how often, after the implementation of emission reduction policies, I worried about this job further	$\alpha = 0.926$	−0.145	0.858	0.112	0.199
[2] In the past 1 year, I have worried and uncertainty about this job		−0.180	0.771	0.163	0.308
[3] I have often concerned about this job's further		−0.234	0.712	0.147	0.322
[4] I have been perceived the risk of loss job		−0.151	0.859	0.109	0.194
Green transformational leadership (Variance = 17.40%)					
[1] Our organizational leader has a long-term ideal environmental vision	$\alpha = 0.898$	0.819	−0.196	0.166	−0.125
[2] Our organizational leader provides a clear environmental plan to follow		0.799	−0.150	0.118	−0.151
[3] Our organizational leader encourages employees to achieve environmental goals		0.879	−0.092	0.113	−0.059
[4] Our organizational leader stimulates employees to think about green ideas		0.877	−0.109	0.078	−0.056
[5] Our organization leader encourages employees to achieve low carbon innovation		0.815	−0.152	0.19	−0.053
Turnover intention (Variance = 14.26%)					
[1] In the past 6 month to 1 year, I have been often looking for a new job opportunity	$\alpha = 0.850$	−0.191	0.300	0.193	0.765
[2] I am planning to leave my current company within 6 months or 1 year		−0.073	0.263	0.161	0.812
[3] I do not have a intention for a long-term work in this company		−0.101	0.284	0.104	0.814

4.3. The Results of Confirmation Factor Analysis and Convergent Validity

Next, the confirmatory factor analysis was conducted to test the validity of the measurement model by AMOS version 22.0. The confirmatory factor analysis results showed that all standardized regression weights of the carbon emission reduction policy were higher than the recommended value of 0.6; composite reliabilities (CR) and average variance extracted (AVE) were greater than the recommended values of 0.7 and 0.5. Similarly, all standardized regression weights of turnover risk perception, green transformational leadership and turnover intention were higher than the recommended value of 0.6 (see Table 4). All measurements of AVE and CR were higher than the recommended criteria index, 0.5 and 0.7. Moreover, the alternative measurement model fit index was as follows: chi-square = 367.215, degrees of freedom = 95, minimum discrepancy = 3.865, GFI = 0.918, CFI = 0.952, IFI = 0.952, root mean square residual = 0.074. Therefore, all measures were acceptable criteria [3].

Table 4. The results of measurements model and convergent validity of CR and AVE.

Research Variables	Factor Loading	Standard Loading	Variances	t-Value	CR	AVE	Square Root of AVE
Carbon emission reduction policy	1	0.864	0.16	–	0.904	0.707	0.841
	0.72	0.646	0.341	15.894			
	0.695	0.638	0.332	15.645			
Turnover risk perception	0.954	0.873	0.133	22.832	0.914	0.727	0.853
	1	0.848	0.234	–			
	0.921	0.821	0.246	22.523			
	0.919	0.781	0.323	20.944			
Green transformational leadership	0.963	0.848	0.217	23.624	0.950	0.724	0.851
	1	0.812	0.235	–			
	1.031	0.82	0.235	19.792			
	1.038	0.817	0.244	19.416			
	0.987	0.789	0.269	18.622			
Turnover intention	0.919	0.78	0.246	28.251	0.889	0.729	0.854
	1.054	0.815	0.236	18.512			
	1.02	0.783	0.254	17.885			
	1	0.789	0.218	–			

Notes: root mean square residual = 0.074, minimum discrepancy = 3.865, GFI = 0.918, CFI = 0.952, IFI = 0.952.

4.4. The Results of Hypotheses Testing by Using SEM Model

Moreover, we also conducted the structural equation model (SEM) to test the hypothesis by using AMOS 18.0. According to the results of SEM modeling, the carbon emission reduction policy has a positive and significant effect on turnover intentions among employees in energy-intensive industries ($\beta = 0.202, p < 0.01$). We also found that carbon emission reduction policy has a positive and significant effect on risk perception of turnover ($\beta = 0.392, p < 0.01$), and the employees' turnover risk perceptions have a positive and significant effect on the turnover intention ($\beta = 0.593, p < 0.01$). Moreover, the carbon emission reduction policy has an indirect effect on turnover intention through turnover risk perception in energy-intensive industries ($\beta = 0.232, p < 0.01$). However, green transformation leadership has an inhibiting effect on turnover intention and turnover risk perception ($\beta = -0.481, p < 0.01$; $\beta = -0.129, p < 0.05$), and green transformation leadership has an indirect effect on employee turnover in energy-intensive industries ($\beta = -0.285, p < 0.01$), thus, all of our hypotheses are supported (see Table 5).

Moreover, we conducted multivariate regression and stepwise regression analyses to test the research hypotheses by using STATA 13.0. The results are shown in Table 6, and the results are as follows. According to the stepwise multivariate regression analysis, by comparison of the R-square, we can confirm that for models 1 to 3, the R-squared of model 3–2 is the highest, followed by model 2. According to the results of model 1–2, the levels of education and income have a positive and significant effect on energy-intensive industries' employees' turnover intentions ($\beta = 0.074, p < 0.01$; $\beta = 0.056, p < 0.01$). However, marriage negatively and significantly affects energy-intensive industries' employees' turnover intentions. According to the results of model 3–2, the carbon emission reduction policy positively and considerably affect energy-intensive industries' employees' turnover intentions ($\beta = 0.153, p < 0.01$). Second, according to model 3–1, the carbon emission reduction policy positively and significantly affects turnover risk perception ($\beta = 0.296, p < 0.01$). Thirdly, turnover risk perception positively and considerably affects the employee turnover intention ($\beta = 0.379, p < 0.01$). Hypothesis 1 is robustly supported (See Table 6). The findings of the SEM model are different with the multiple regression analysis; this is because the auto correlation and residuals errors were controlled, and we omitted the individual control variables in the SEM model.

Table 5. Results of structural equation modeling.

Summary of the Hypothesis Path	Estimate Coefficient	Bias–Corrected 95% CI		Result
		Lower	Upper	
Carbon emission reduction policy → employees' turnover intention	0.202 ***	0.103	0.298	Supported
Carbon emission reduction policy → employees' turnover risk perception	0.392 ***	0.285	0.485	Supported
Employees' turnover risk perception → turnover intention	0.593 ***	0.462	0.684	Supported
Carbon emission reduction policy → employees' turnover risk perception → turnover intention	0.232 ***	0.308	0.178	Supported
Green transformational leadership → employees' turnover risk perception	−0.481 ***	−0.568	−0.381	Supported
Green transformational leadership → turnover intention	−0.129 **	−0.234	−0.018	Supported
Green transformational leadership → employees' turnover risk perception → turnover intention	−0.285 ***	−0.360	−0.220	Supported

Notes: *** $p < 0.01$, ** $p < 0.05$, Chi-square = 408.078, degrees of freedom = 96, minimum discrepancy = 4.251, GFI = 0.911, CFI = 0.945, IFI = 0.946, root mean square residual = 0.068.

Table 6. Results of multivariate regression analysis.

Variables	Model (1–1) Tintention	Model (1–2) Tintention	Model (2) Ptrisk	Model (3–1) Ptrisk	Model (3–2) Tintention
logmcrp1	0.345 *** (0.0491)	0.265 *** (0.0428)	0.370 *** (0.0585)	0.296 *** (0.056)	0.153 *** (0.0384)
logmtrp2					0.379 *** (0.0295)
gender3	0.001 (0.0220)	−0.007 (0.0193)	0.0276 (0.0262)	0.02785 (0.0250)	−0.0181 (0.0168)
marriage4	−0.066 *** (0.0232)	−0.0888 *** (0.0228)	−0.0632 ** (0.0278)	−0.0535 ** (0.0296)	−0.0685 ** (0.0200)
age5	−0.018 (0.0165)	0.108 (0.018)	−0.0465 ** (0.020)	−0.0496 ** (0.0232)	−0.0296 * (0.0156)
education6		0.074 *** (0.0079)		0.0618 *** (0.0102)	0.0051 *** (0.0071)
income7		0.056 *** (0.0082)		0.0469 *** (0.0023)	0.0383 *** (0.00730)
size8		0.0006 (0.0072)		0.0030 (0.0093)	−0.0005 (0.0063)
location9		0.032 ** (0.0032)		0.0588 *** (0.0172)	0.0099 (0.0117)
experience10		−0.0119 (0.016)		0.0347 (0.0212)	−0.0326 ** (0.0143)
Constant	0.9034 (0.0800)	0.574 (0.0088)	0.819 (0.0954)	0.4093 (0.1147)	0.4186 (0.0783)
Observations	531	531	531	531	531
R-squared	0.102	0.338	0.081	0.208	0.497

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

We also conducted the stepwise multivariate regression analysis to explore the effect of green transformational leadership in energy-intensive corporations. According to model 4–1 to model 6–2, the R-squared weight of the 6–2 model is the highest, followed by model 6–1. According to the results of model 6–1, the level of the carbon emission reduction policy and turnover risk perception positively and significantly affects energy-intensive industries' employees' turnover intentions ($\beta = 0.221$, $p < 0.01$; $\beta = 0.434$, $p < 0.01$). However, marriage negatively and significantly affect the energy-intensive industry's employee turnover intention ($\beta = -0.038$, $p < 0.05$). According to the results of model 4–2, the level of education and income monthly positively and significantly affect energy-intensive industries' employees' turnover intentions ($\beta = 0.0633$, $p < 0.01$; $\beta = 0.0521$, $p < 0.01$). The location also positively and significantly affect energy-intensive industries' employees' turnover intentions ($\beta = 0.0325$, $p < 0.01$). Second, according to model 6–2, green transformational leadership negatively and significantly affect the employee turnover

intention ($\beta = -0.080$, $p < 0.01$). Job experience and marriage have a negative impact on the employees' turnover intentions (see Table 7).

Table 7. Results of multiple regression analysis.

Variables	Model (4–1) Tintention	Model (4–2) Tintention	Model (5) Ptrisk	Model (6–1) Tintention	Model (6–2) Tintention
logmcrp	0.446 *** (0.0478)	0.345 *** (0.0431)	0.437 *** (0.0538)	0.221 *** (0.0447)	0.191 *** (0.0412)
logmtrp				0.434 *** (0.0327)	0.350 *** (0.0317)
logmgltl	−0.303 *** (0.0366)	−0.214 *** (0.033)	−0.382 *** (0.0205)	−0.111 *** (0.0348)	−0.080 ** (0.0324)
gender	−0.005 (0.0207)	−0.011 (0.0186)	0.020 (0.0232)	−0.0133 (0.0179)	0.189 (0.0168)
marriage	−0.067 ** (0.0212)	−0.0929 *** (0.022)	−0.061 ** (0.028)	−0.038 ** (0.0191)	−0.0716 *** (0.0199)
age	−0.003 (0.0156)	0.021 (0.1730)	−0.031 (0.0210)	−0.007 (0.0135)	0.0321 ** (0.0156)
education		0.0633 *** (0.0078)	0.042 *** (0.0967)		0.048 *** (0.072)
income		0.0521 *** (0.0794)	0.0398 *** (0.0100)		0.0381 *** (0.0073)
size		0.0019 (0.007)	0.005 (0.009)		0.0001 (0.0063)
location		0.0325 ** (0.0128)	0.059 *** (0.016)		0.0117 (0.0116)
experience		−0.023 (0.0158)	0.028 (0.0190)		−0.0329 ** (0.0143)
Constant	1.053 *** (0.077)	0.720 *** (0.088)	0.671 *** (0.110)	0.603 *** (0.075)	0.485 *** (0.260)
Observations	531	531	531	531	531
R-squared	0.198	0.375	0.305	0.398	0.493

Note: *** $p < 0.01$, ** $p < 0.05$.

4.5. Heterogeneity Testing

According to the demographic analysis, we used the regression model under different conditions, such as type of industry, different gender, location, income level, and education. According to different industry (the results are shown in Table 8), the environmental regulation through the emission reduction policy has a positive and significant effect on the turnover intention among employees in construction and mining, oil and thermal power, and chemical industries ($\beta = 0.462$, $p < 0.01$; $\beta = 0.141$, $p < 0.05$; $\beta = 0.144$, $p < 0.1$). However, environmental regulation through the emission reduction policy has no significant effect on the turnover intention among the steel industry employees. Moreover, we did not see the heterogeneity effect between the turnover risk and turnover intention in energy-intensive industries. We also found that green transformational leadership negatively and significantly affects turnover intention in the steel industry. However, the green transformational leadership has no significant effect on employee turnover intention in the construction, mining and oil energy industry, auto industry and chemical industry. The education level has a positive effect on employees' turnover intentions, and marriage has a negative effect on employees' turnover intentions in the steel industry and mining and oil energy industry (see Table 8).

Table 8. Results of multivariate regression analysis among different industries.

Variables	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)
	logmturn1	logmturn1	logmturn1	logmturn1	logmturn1
	Steel Industry	Construction	Mining and Oil Energy Industry	Auto Industry	Chemical Industry
logmcrp	0.0713 (−0.152)	0.462 *** (−0.111)	0.141 ** (−0.0691)	0.0659 (−0.0505)	0.144 * (−0.0835)
logmtrp	0.458 *** (−0.0883)	0.215 *** (−0.0794)	0.179 *** (−0.0628)	0.150 *** (−0.0407)	0.368 *** (−0.12)
logmgtl	−0.204 * (−0.106)	−0.0259 (−0.078)	−0.0573 (−0.0567)	−0.0465 (−0.0382)	0.111 (−0.111)
gender	0.00308 (−0.0511)	−0.00766 (−0.0469)	−0.0585 * (−0.0346)	0.0158 (−0.0249)	0.014 (−0.0588)
marriage	−0.284 *** (−0.0777)	−0.0696 (−0.0478)	−0.0459 * (−0.0265)	0.0196 (−0.0188)	0.00642 (−0.0554)
age	0.144 ** (−0.0627)	−0.00644 (−0.0405)	0.0223 (−0.0247)	0.0122 (−0.0182)	0.0278 (−0.0409)
education	0.0536 ** (−0.0228)	0.103 *** (−0.0208)	0.0399 ** (−0.0165)	0.00705 (−0.00781)	0.0412 *** (−0.0132)
income	0.0692 *** (−0.0238)	0.0157 (−0.02)	0.0135 (−0.0159)	0.00832 (−0.0078)	0.0119 (−0.0153)
size	0.0084 (−0.0201)	0.0118 (−0.016)	−0.00416 (−0.0112)	−0.000281 (−0.00857)	−0.00114 (−0.0136)
location	0.00867 (−0.0356)	0.112 ** (−0.0447)	0.0267 (−0.0205)	0.00203 (−0.0137)	−0.0159 (−0.0345)
experience	−0.186 *** (−0.0543)	−0.00742 (−0.0418)	−0.0214 (−0.0236)	−0.0146 (−0.018)	−0.0179 (−0.032)
Constant	0.753 *** (−0.251)	−0.129 (−0.196)	0.809 *** (−0.16)	0.992 *** (−0.113)	0.423 * (−0.297)
Observations	84	91	149	159	48
R-squared	0.655	0.695	0.265	0.178	0.548

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

According to the gender, company sizes, and education the results are shown in model (1) and model (2) in Table 9. Environmental regulation through the emission reduction policy positively and significantly affects turnover intention among male employees ($\beta = 0.239$, $p < 0.01$). However, the emission reduction policy has an insignificant effect on turnover intention among female employees, but the perception of turnover risk has a substantial impact on employees' turnover intentions. Green transformational leadership has a negative and significant effect on turnover intention among different genders and company sizes. However, green transformational leadership has no significant effect on the turnover intention among high education level employees. The monthly income level has a positive and significant impact on turnover intention among employees in energy-intensive industries. We found that, compared with a small-sized company, the carbon reduction policy has a more significant effect on a large company's turnover intention among employees, that is, the performance of energy-intensive enterprises was affected by environmental regulation through the carbon emission reduction policy and, in turn, it affected the individual income and welfare.

Table 9. Result of multivariate regression analysis for different gender, company size, education level.

Variables	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
	logmturn1	logmturn1	logmturn1	logmturn1	logmturn1	logmturn1
	Males	Females	Less 1500	Over 1500	Under University	Above University
logmcrp	0.239 *** (0.0479)	0.123 (0.100)	0.128 ** (0.0544)	0.350 *** (0.0702)	0.201 *** (0.0634)	0.143 *** (0.0456)
logmtrp	0.374 *** (0.0371)	0.473 *** (0.0716)	0.398 *** (0.0409)	0.388 *** (0.0534)	0.363 *** (0.0445)	0.252 *** (0.0415)
logmglt	−0.103 ** (0.0399)	−0.114 * (0.0668)	−0.0870 ** (0.0427)	−0.115 ** (0.0553)	−0.0989 ** (0.0448)	0.0129 (0.0436)
marrige	−0.0898 *** (0.0242)	−0.0763 * (0.0406)	−0.0744 ** (0.0308)	−0.0573 * (0.0321)	−0.115 *** (0.0296)	−0.0144 (0.0225)
age	0.0110 (0.0192)	0.0509 (0.0319)	0.0335 (0.0229)	−0.0225 (0.0287)	0.0378 * (0.0224)	−0.0229 (0.0185)
income	0.0526 *** (0.00907)	0.0280 ** (0.0135)	0.0456 *** (0.0103)	0.0381 *** (0.0110)	0.0660 *** (0.0121)	0.0184 ** (0.00728)
location	−0.00607 (0.0150)	0.00175 (0.0197)	−0.00308 (0.0138)	0.00735 (0.0286)	−0.00661 (0.0152)	0.0100 (0.0171)
jobexp	−0.0399 ** (0.0164)	−0.0645 (0.0415)	−0.0200 (0.0224)	−0.0354 (0.0236)	−0.0506 ** (0.0200)	−0.00896 (0.0179)
Constant	0.616 *** (0.0890)	0.640 *** (0.151)	0.616 *** (0.101)	0.492 *** (0.134)	0.595 *** (0.104)	0.822 *** (0.0907)
Observations	384	147	316	215	324	207
R-squared	0.476	0.423	0.433	0.517	0.452	0.312

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Moreover, we found a robust influence effect between the perception of turnover risk and turnover intention in both small and large energy industries. We also found that green transformational leadership has a negative and significant impact on turnover intention among employees with a university education level. The income level positively affects employee turnover intentions, and marriage negatively affects employee turnover intentions, excluding high-level education employees (see Table 9).

Lastly, according to different locations and job experiences, the results are shown as model (1) and model (2) and model (3) in Table 10. Environmental regulation through the emission reduction policy has a positively and significant effect on turnover intention among employees in east, central and west areas ($\beta = 0.113$, $p < 0.1$; $\beta = 0.309$, $p < 0.01$; $\beta = 0.146$, $p < 0.01$). In addition, the perception of turnover risk has a positive impact on employee turnover intention in east and central areas ($\beta = 0.306$, $p < 0.01$; $\beta = 0.343$, $p < 0.01$). Green transformational leadership has a negative and significant effect on turnover intention in central and west areas. The monthly income and education levels positively and significantly affect turnover intention among employees in the east and central areas. Moreover, we found that the levels of income and education positively affect employees' turnover intentions in east and central energy-intensive industries (See Table 10).

Table 10. Result of multivariate regression analysis for a different location and job experience level.

Variables	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)
	logmturn1	logmturn1	logmturn1	logmturn1	logmturn1
	East	Central	West	Less 5 Years	More 5 Years
logmcrp	0.113 * (0.0632)	0.309 *** (0.0637)	0.146 * (0.0845)	0.342 *** (0.0617)	0.0400 (0.0548)
logmtrp	0.306 *** (0.0462)	0.343 *** (0.0485)	0.118 (0.105)	0.340 *** (0.0469)	0.340 *** (0.0415)
logmgtl	−0.0328 (0.0466)	−0.151 *** (0.0575)	−0.105 * (0.0619)	−0.139 *** (0.0523)	−0.00735 (0.0413)
gender	−0.00745 (0.0256)	−0.0194 (0.0279)	0.0347 (0.0269)	−0.00675 (0.0262)	−0.0137 (0.0212)
marrige	−0.0661 * (0.0372)	0.00490 (0.0259)	0.0034 (0.0002)	−0.0266 (0.0257)	−0.0195 (0.0522)
age	0.00693 (0.0228)	−0.00307 (0.0208)	0.0259 (0.0337)	0.0211 (0.0260)	−0.00137 (0.0211)
edu	0.0441 *** (0.0117)	0.0750 *** (0.0119)	0.0116 (0.0118)	0.0766 *** (0.0121)	0.0297 *** (0.00860)
income	0.0662 *** (0.0127)	0.0174 * (0.0100)	0.00837 (0.0196)	0.0238 ** (0.0107)	0.0455 *** (0.0101)
size	−0.00150 (0.0123)	0.000923 (0.00929)	0.00371 (0.0128)	0.00547 (0.00978)	−0.00466 (0.00916)
Constant	0.497 *** (0.130)	0.303 ** (0.123)	1.034 *** (0.181)	0.207 * (0.114)	0.621 *** (0.121)
Observations	255	212	64	224	307
R-squared	0.442	0.628	0.159	0.653	0.352

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

5. Conclusions

5.1. Discussion

With the worsening of environmental pollution and the deterioration of climate change, characterized by increasing carbon emissions and the greenhouse effect, the sustainable global economy is seriously constrained [60,61]. The emission of carbon dioxide and greenhouse gases has been a significant concern for world economic development [62,63]. Many government countries have set environmental regulations to promote environmental innovation, reduce pollutant emissions, and protect the environment [64–66]. China, as the world's largest emitter of carbon emissions, is facing enormous pressure to reduce emissions. Companies, as the micro-main body of the market, and the industry have to adapt to climate change [67,68]. Thus, energy-intensive manufacturing undertakes its role in the energy conservation mission and in emission reduction [69–72].

Meanwhile, in September 2016, the Standing Committee of the National People's Congress of China approved China's accession to the Paris Agreement. In this context, China's government has begun to target energy-intensive companies with specific policies. This type of environmental regulation through a low carbon reduction policy can be defined as an administrative command-controlled environmental regulation, which can affect corporate economic performance, and, in turn, affect the welfare and income of employees, increasing employee turnover rate.

This present research identified the factors affecting employees' turnover intentions in energy-intensive industries and built a theoretical model of factors influencing employee turnover intentions in energy-intensive industries from a carbon emission policy perspective. Using a questionnaire survey, reliability analysis, exploratory factor analysis, confirmation factor analysis, structural equation model, multiple regression models to explore the influencing factors for employees' turnover intention in the energy intensive industry, we found that environmental regulation through a carbon emission reduction policy and the perception of turnover risk have a significant effect on employees' turnover intentions. This is because energy conservation and emission reduction policies reduce

energy-intensive enterprises' organizational performance, which in turn, reduce employee rewards and incomes. Furthermore, we have found that perception of turnover risk has a mediating effect between carbon emission reduction policy and turnover intention. Thus, it can be concluded that employees' perceptions of turnover risk can harm employee satisfaction and well-being and enhance job burnout, these finding were consistent with the previous studies [43–45,73–76]. Moreover, we found that green transformational leadership has an essential inhibiting effect on the perception of turnover risk and turnover intention among employees in energy-intensive corporations. According to the results of heterogeneity test, carbon reduction policy has no effect on auto industry employees' turnover intentions, and environmental regulation through a carbon emission reduction policy and green transformational leadership have no significant effect on turnover intention among more experienced workers.

5.2. Managerial Implications

Based on the research results mentioned above, this paper suggests that it is better for energy-intensive companies to positively respond to the country's environmental protection policies, and it is better to enhance the level of green technology or low carbon product innovation to promote the sustainable green development of energy-intensive companies. More specifically, the suggestions are the following. Firstly, through green or low carbon innovation, promote green transformation. Energy-intensive companies should follow the green transformation trend in China and turn environmental constraints into new green opportunities to improve corporate advancement of green innovation capability. Secondly, through technology innovation, promote companies' performance by driving independent intellectual property rights. Third, the energy-intensive companies' managers should improve employees' positive psychological capital, for example, in practice with green transformational leadership and team-oriented innovative human resource management activities, enhancing employee satisfaction and green innovation, avoiding employee turnover, and promoting the green sustainable development of energy-intensive companies. Fourth, it is better to educate and enhance the competence of green transformational leadership in energy-intensive enterprises because green transformational leadership has a negative impact on employee turnover risk perception and turnover intention, green transformational leadership also can enhance low carbon innovation and reduce employee turnover rate in the industrial transformation, which can promote environmental performance.

5.3. Limitations and Future Recommendations

The present research has a few limitations. This sample consists mainly of primary data from energy-intensive industries; however, we did not collect secondary data, such as turnover rate of energy-intensive industries. Further study with better research of energy-intensive companies' turnover rates and organizational effectiveness are needed. This study did not consider the different types of environmental regulations and executive compensation with turnover rate or organizational effectiveness [44,45]. It is better to consider the different types of environmental regulations, such as a governmental subsidy with organizational resilience and organizational effectiveness [3]. We also recommend further study, considering energy-intensive corporations' green innovation and organizational effectiveness, such as employee satisfaction, economic performance and turnover rate [77–79].

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