How Does Green Transformational Leadership Influence Employee Green Behavior? –Based on the Mediating Effects of Self–Efficacy, Green Positivity and Green Organizational Culture

Li Li[1], and Muhammad Shahid Khan[2]

Innovation Management College, Suan Sunandha Rajabhat University, Thailand

[1]Corresponding Author. E–mail: 23880482@qq.com

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Abstract

The increasing volume of research on employee green behavior and its role in enhancing workplace environmental practices is notable. However, a gap persists in comprehending the underlying psychological mechanisms driving these behaviors. This study delves into the influence of green transformational leadership on employee green behavior, exploring its intricate relationship with green self–efficacy, green positive thinking, and the organization's green culture, grounded in relevant theoretical frameworks. Environmental factors are also considered, with an examination of how organizational green identity moderates these dynamics. The findings highlight the substantial impact of green transformational leadership on shaping employees' green behavior, a relationship further nuanced by the presence of green organizational culture, green self–efficacy, and green mindfulness. Additionally, environmental concerns act as a positive moderator, reinforcing the influence of green transformational leaders on employees' eco–friendly behavior. This research unveils the foundational psychological drivers behind the promotion of environmentally responsible behavior among employees, offering valuable insights for fostering sustainable business growth.

Keywords: Employee green behavior; green transformational leadership; green self–efficacy; green mindfulness; green organizational culture; Guangxi manufacturing industry

Introduction

Environmental protection, crucial for human survival and development, has become a global priority due to rapid economic growth and environmental issues (Ones & Dilchert, 2012) Consequently, managers are now aiming for environmental sustainability while promoting economic development, a new requirement for enterprise development (Chen, 2008: Zhu et al., 2015).

In this context, the focus is on how business personnel can be environmentally friendly. Manufacturing businesses need to develop sustainably to advance social and economic sustainability, meet the "3060" carbon target, and promote ecological sustainability (Jialiang & Jun, 2016). Fulfilling social responsibility under the concept of green governance and improving green performance can help enterprises achieve synergistic development of economic and social benefits.

Employees, the drivers of an organization's green development, play a key role in environmental protection and competitive benefits. "Green behavior" is any activity that contributes to environmental preservation and sustainability (Ones & Dilbert, 2012). The achievement of a company's environmental sustainability objectives is correlated with employee green behavior. Therefore, stimulating employees' green behavior is crucial for enterprises to achieve sustainable development goals.

However, current studies on green transformational leadership and green employee behavior are limited and lack depth. Most research examines the role of individual green motivation in the process of green transformational leadership on employee green behavior, failing to fully reveal the potential mechanisms affecting the green behavior of the employees.

To address the shortcomings of current research on employee green lines, this paper proposes the following three key questions:

1. What is the effect of green transformational leadership on employees' green behavior?

2. Does green self–efficacy, green mindfulness, and green organizational culture mediate the relationship between transformational leadership and employees' green behavior?

3. How to change employees' behavior into green behavior?

This study aims to explore the impact of green transformational leadership style on the green behavior of employees in manufacturing enterprises under the dual carbon goals, including its impact on environmental performance.

Objective

1. To discuss the effect of green transformational leadership on employees' green behavior.

2. To discuss whether green self-efficacy, green mindfulness, and green organizational culture play a mediating role between transformational leadership and employees' green behavior from a rational and emotional perspective.

3. To explore the interaction of rational cognition and emotional emotion on behavior, that is, the moderating role of green organizational identity between green transformational leadership and employees' green behavior.

Scope of Research

This research extends the study on corporate environmental responsibility effectiveness. Environmental governance remains a high-priority issue, and the environmental protection responsibilities of enterprises have become a focal point in the post-epidemic era. Thus, employees' green behavior continues to be a significant research topic. Previous studies primarily focused on the macro level of corporate environmental responsibility. This paper, however, considers both micro and macro levels, focusing on employees' rational and emotional cognition. It enriches the theory of green transformational leadership within the context of Chinese culture and its relationship with employees, deepening the understanding of sustainable development and social exchange theory.

In the "double carbon" goal context, manufacturing companies must transition from high energy consumption and high pollution production modes to achieve long-term development. Studying the path for green innovation in manufacturing enterprises is practically significant, guiding for improving green performance:

Firstly, for managers, understanding the impact mechanism of employees' green behaviors is crucial. This understanding can guide efforts to enhance employees' environmental protection awareness and stimulate green behaviors, promoting better fulfillment of environmental responsibilities.

Secondly, for enterprises, this understanding can aid in strengthening environmental management concepts, establishing an internal environmental management system, forming a green business model, and promoting green strategic transformation for sustainable development.

Literature reviews

Green transformational leadership

Green transformational leadership encourages and supports environmental protection measures, motivating individuals and organizations to exceed expectations in environmental behaviors and achieve environmental goals (Chen & Chang, 2013; Robertson & Barling, 2013; Saifulina & Carballopenela, 2017). It's classified into four dimensions: environmental idealized influence, environmental inspirational motivation, environmental intellectual stimulation, and environmental personalized consideration (Robertson & Barling, 2013). This leadership style influences employees' voluntary environmental behavior through internal motivation and emotional states (Graves et al., 2013), and is a significant predictor of employee green behavior and environmental performance (Jiakui et al., 2023).

Employee green behaviour

Employee green behavior is a series of voluntary, environmentally sustainable actions carried out in the workplace to reduce negative effects (Kim et al., 2017). Such behaviors, like reducing pollution and saving materials, can reduce environmental costs, achieve resource recycling, positively affect organizational environmental performance, establish a positive enterprise image, and enhance public recognition.

Green self–efficacy

Green self–efficacy is an individual's judgment of their ability to achieve an environmental goal (Chen et al., 2015). Empirical studies show that green sustainable practices impact firm performance through managerial responsibility and waste management, with green self–efficacy

playing a moderating role (Guo et al., 2019). Green human resource management impacts employees' green innovation behaviors through green mindfulness and green self-efficacy.

Green mindfulness

Green mindfulness is a conscious state where individuals are implicitly aware of environmental information and knowledge (Chen, 2014). It focuses on recognizing and accepting one's physical and mental experience and objective reality, connecting the individual to the world, and directing attention to the natural environment (Barbaro & Pickett, 2016).

Green organizational culture

Green organizational culture, incorporating environmental issues into the organizational culture, guides employees' behaviors and meaning construction process It generates strong cohesion and creativity, significantly impacting employees' green behaviors. In the sustainability context, it inspires organizational responsibility and commitment, facilitates a change in employees' environmental attitudes, and increases their willingness to make extra efforts beyond their assigned duties, thereby increasing their green behaviors (Gürlek & Tuna, (2017).

Green organizational identity

Green Organizational Identity (GOI) is a concept proposed by Chen (2011) to explore how enterprises can enhance green management efficiency and form green competitiveness. It establishes a comprehensive organizational identity model in environmental management. However, Liu Tiansen's (2020) research shows that GOI doesn't significantly improve green innovation performance, a finding that differs from previous studies and may be influenced by industry and regional heterogeneity.

Green transformational leadership and employee green behavior

Green transformational leadership can subtly shape employees' identities, inspiring them to exhibit more green behaviors (Kura, 2016). This paper proposes that managers, through their influence and role modeling, can guide employees toward environmental protection values. The following hypothesis is offered by this paper:

H1: There is a significant impact of transformational green leadership on employee green behavior.

Green transformational leadership and green self–efficacy

Green transformational leaders, as organizational environmental management experts, can improve Green Self–Efficacy (GSE) by supporting employees' environmental protection efforts and instilling confidence to overcome environmental objectives (Bandura, 1999). Therefore, Hypothesis

H2 : There is a significant impact of green transformational leadership on green self–efficacy.

Green Self–efficacy and Employee Green Behavior

Self–efficacy is a significant internal motivator of employees' behavior (Gist, 1989). Studies show a link between employees' green self–efficacy and their green behaviors (Wu et al., 2017). Therefore, Hypothesis

H3: There is a significant impact of green self–efficacy on employee green behavior

The mediating role of green self–efficacy

Green self–efficacy can predict favorable environmental behavior (Huang, 2016). It can serve as a mediator between worker behavior and leadership behavior (Nordlund, 2003; Chen, 2013). Using the aforementioned research as a foundation, the following hypotheses are presented in this study:

H4 : Green self–efficacy mediates the relationship between green transformational leadership and employee green behavior.

Green transformational leadership and green mindfulness

Green transformational leadership can foster a culture of environmental mindfulness within an organization (Chen et al., 2014; Nisar et al., 2017). Therefore, Hypothesis

H5 : There is a significant impact of green transformational leadership on green mindfulness.

Green mindfulness and employee green behavior

Green mindfulness can encourage sustainable actions (Guo et al., 2019). Therefore, it is hypothesized that

H6: There is a significant impact of green mindfulness on employee green behavior.

The mediating role of green mindfulness.

Green mindfulness influences workers' eco–friendly behavior under green transformational leadership (Chen & Wu, 2022). Therefore, Hypothesis

H7 : Green mindfulness mediates the relationship between green transformational leadership and employee green behavior.

Green transformational leadership and green organizational culture

Green transformational leadership can inspire the formation of a shared core value concept of environmental responsibility (Li et al., 2020). Therefore, Hypothesis

H8 : There is a significant impact of green transformational leadership on green organizational culture.

Green organizational culture and employee green behavior

Green organizational culture significantly enhances employees' green behavior (Zhang et al., 2019) Therefore, hypothesis

H9 : There is a significant impact of green organizational culture on employee green behavior.

The mediating role of green organizational culture.

Green organizational culture can mediate the relationship between green transformational leadership and employee green behavior, fostering a sense of obligation and loyalty to the company, and enhancing employees' willingness to put forth extra effort for environmental sustainability (Gürlek & Tuna, 2017; Maitlo et al., 2022). As a result, the hypothesis is proposed as follows:

H10: Green organization culture mediates the relationship between green transformational leadership and employee green behavior.

Hypothesized development of green organizational identity

The concept of Green Organizational Identity (GOI) is a powerful tool that can explain the correlation between green performance, creativity, and innovation. It also influences the green behavior of employees and their perception of transformational leadership (Parida et al., 2021; Zafar et al., 2022). This study puts forward a hypothesis that GOI plays a moderating role in the relationship between green transformational leadership and employee green behavior. Therefore, the hypothesis is as follows:

H11: Green organizational identity moderates the relationship between green transformational leadership and employee green behavior.

Conceptual Framework

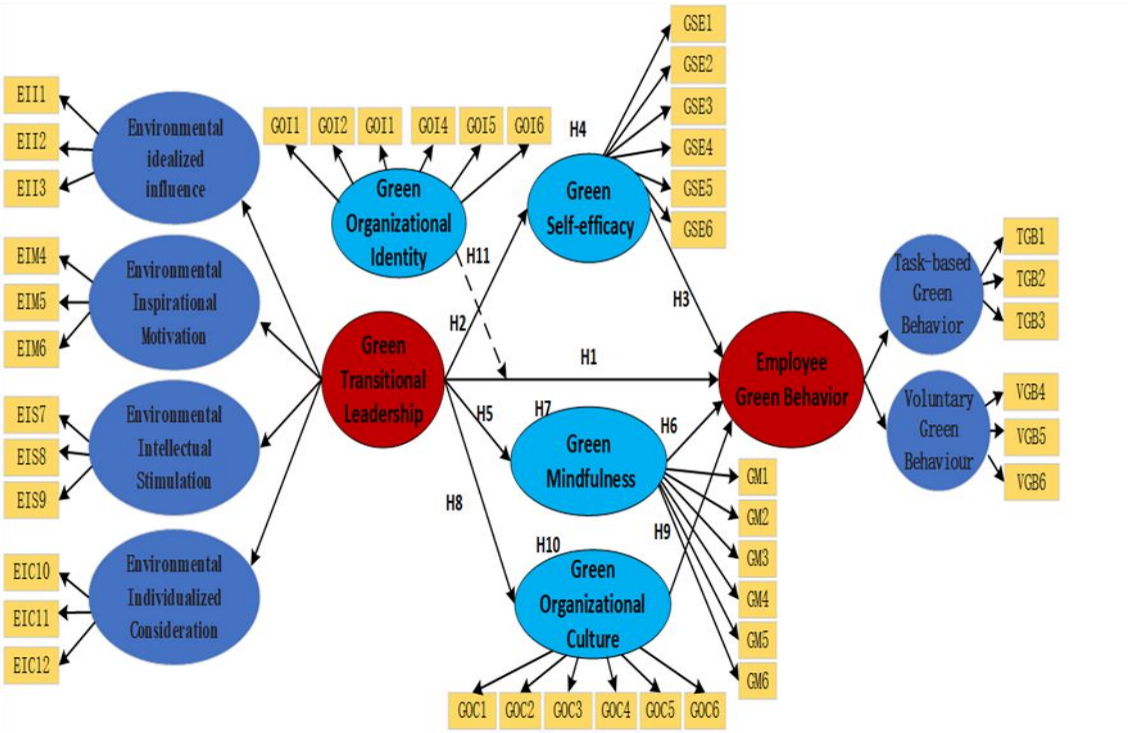

Figure 1. Conceptual Framework

Methodology

This study employs a sequential mixed methods design (Tashakkori & Teddlie, 2003), collecting and analyzing quantitative data first, followed by qualitative data. The study focuses on employees of manufacturing companies in Guangxi, China.

The study uses SPSS software to analyze data on green transformational leadership (independent variable), employee green behavior (dependent variable), green positive thinking, green self-efficacy, green organizational culture (mediator variables), and green organizational identity (moderating variable). In-depth interviews were conducted using purposive sampling to analyze the model of factors affecting employee green behavior.

Data was collected via an online questionnaire sent to manufacturing enterprises in Guangxi. After a small sample test, 382 valid samples were retained from 456 questionnaires. The majority of the samples were male (63.87%) and aged 31-40 years old (45.29%).

The study used a 5 -point Likert subscale for all scales, with 5 indicating complete agreement and 1 indicating complete disagreement.

Green Transformational Leadership Measurement: The 12-item scale by Robertson and Carleton (2018) was used to measure green transformational leadership. The scale, with a Cronbach's alpha coefficient of 0.94, includes items like "My leadership encourages me to think about environmental issues differently".

Employee Green Behavior Measurement: A 6-item scale by Bissing-Olson et al. (2013) was used to measure employee green behavior, focusing on task-related and voluntary green behavior, including items like "I take the opportunity to actively participate in environmental protection at work".

Green Self-Efficacy Measurement: Chen's (2014) 6-item scale was used to measure green self-efficacy, including items like "I think I can successfully realize the idea of environmental protection".

Green Mindfulness Measurement: A 6-item scale, modified from Williams and Seaman (2010), was used to measure green mindfulness, including items like "I am encouraged to express different views concerning environmental issues and problems".

Green Organizational Culture Measurement: A 6-item scale developed by Fraj, Martinez, & Matute (2011) and Wang (2019) was used to measure green organizational culture, including items like "Our firm has a clear policy statement urging environmental awareness in every area of operations".

Green Organization Identity Measurement: Chen's (2014) 6-item scale was used to measure green organization identity, including items related to corporate environmental management and protection, including items like "The top managers, middle managers, and employees of the organization are proud of its history regarding environmental management and protection".

Interview Questionnaire

In-depth interviews with 22 managers in Guangxi manufacturing enterprises were conducted to test research hypotheses. Open-ended questions were used to allow subjects to fully express their characteristics and key events.

Data Analysis

SPSS 25.0 and Smart–PLS were used for quantitative analyses. Smart–PLS was used for validation factor analysis and model testing. Convergent validity was explained by factor loading, complex reliability (CR), and average variance extracted (AVE) following Fornell and Larcker (1981).

Results

Model fit R–squared

Table 1 R–square of model fit

	R^2	Adjusted R2
C–GSE	0.337	0.335
D–GM	0.364	0.362
E–GOC	0.369	0.368
F–EGB	0.602	0.595

The R–squared explanatory degree of endogenous latent variables is typically greater than 0.67, indicating a strong degree of explanation. A value between 0.33–0.67 suggests a moderately strong degree of explanation, 0.19–0.33 indicates a lesser degree of explanation, and a value lower than 0.19 suggests almost no degree of explanation. The results of this study, as shown in the table below, reveal that the R^2 of C–GSE, D–GM, E–GOC, and F–EGB are 0.337, 0.364, 0.369, and 0.602 respectively. These values, all falling between 0.33 and 0.67, indicate a relatively strong degree of explanation.

Predictive relevance indicator Q2

Table 2 Q–square of Predictive Relevance Indicators

	SSO	SSE	Q^2 (=1-SSE/SSO)
C-GSE	2292	1771	0.227
D-GM	1910	1416	0.259
E-GOC	1910	1431	0.251
F-EGB	764	430	0.437

Q-square represents the predictive correlation from exogenous to endogenous variables, typically ranging between 0–1. A Q-square greater than 0 indicates that the model has predictive capability, while a Q-square less than 0 suggests no prediction. A value between 0.02–0.13 indicates small prediction, 0.13–0.26 indicates average prediction and a value greater than 0.26 indicates strong prediction. The results of this study, as shown in the table below, reveal that the Q^2 of C-GSE, D-GM, and E-GOC were 0.227, 0.259, and 0.251 respectively, falling between 0.13–0.26, which indicates a relatively strong prediction. The Q^2 of F-EGB was 0.437, greater than 0.26, indicating a relatively strong prediction. This suggests that the predictive relevance indicator Q2 of each explanatory variable of the research model possesses a stronger predictive ability.

Covariance diagnosis VIF

Table 3 Covariance of Indicators of Measured Variables

	VIF
EGB1	2.010
EGB2	2.070
EGB3	1.772
EGB4	1.962
EGB5	1.857
EGB6	1.898
EIC	1.916
EII	2.009
EIM	2.026
EIS	1.923
GM1	2.414
GM2	2.263
GM3	2.397
GM4	2.265
GM5	2.724
GOC1	1.904
GOC2	2.231
GOC3	2.137
GOC4	2.328
GOC5	2.049

GOI1	2.094
GOI2	1.994
GOI3	2.323
GOI4	2.142
GOI5	2.353
GOI6	2.379
GSE1	2.169
GSE2	2.091
GSE3	2.273
GSE4	2.484
GSE5	2.529
GSE6	2.221
GTL1	2.370
GTL10	1.803
GTL11	2.029
GTL12	1.992
GTL2	1.884
GTL3	2.058
GTL4	1.829
GTL5	1.874
GTL6	2.091
GTL7	1.904
GTL8	1.768
GTL9	1.712
Task	1.335
Vol	1.335

The diagnostic analysis of the covariance of the model was carried out and the results are shown in Table 4.3, which shows that the VIF between the measured variables is all below 8, and the VIF between the latent variable factors is also below 8, which indicates that there is no covariance in the model.

Table 4 Latent variable indicator covariance

	F-EGB
A-GTL	2.385
B-GOI	1.154
C-GSE	1.562
D-GM	1.652
E-GOC	1.661
GTL×GOI	1.024

Model fit SRMR

Table 5 Model fit SRMR

	Models of saturation	Estimated model
SRMR	0.056	0.068

From the above table, it can be obtained that the SRMR in this study is 0.056 which is less than 0.08 indicating that the model is acceptable.

Path size significance

The magnitude and significance of the path coefficient are utilized to assess the relationship between research hypotheses. When the sample data are standardized, the path coefficient will range between 1 and –1. A value closer to 1 indicates a more positive correlation, while a value closer to –1 indicates a more negative correlation. The T-value can be further calculated by dividing the path coefficient by the standard deviation. According to past research, when the study's sample size exceeds 30, the quartile of the normal distribution can be used as the critical value. If the T-value is larger than the critical value, it can be stated that there is a significant level of significance under a certain level of error. The critical value is typically 1.96 (significant level of 5%), 2.57 (significant level of 1%), and 3.29 (significant level of 0.1%) (Hair Jr et al., 2013). In this study, path coefficients and T-values were calculated using Bootstrapping. The number of Bootstrap cases was set to 5000 for the calculation of path coefficients and T-values. The path coefficients of the structural model in this study are displayed in the following figure, and the results are presented in the table below.

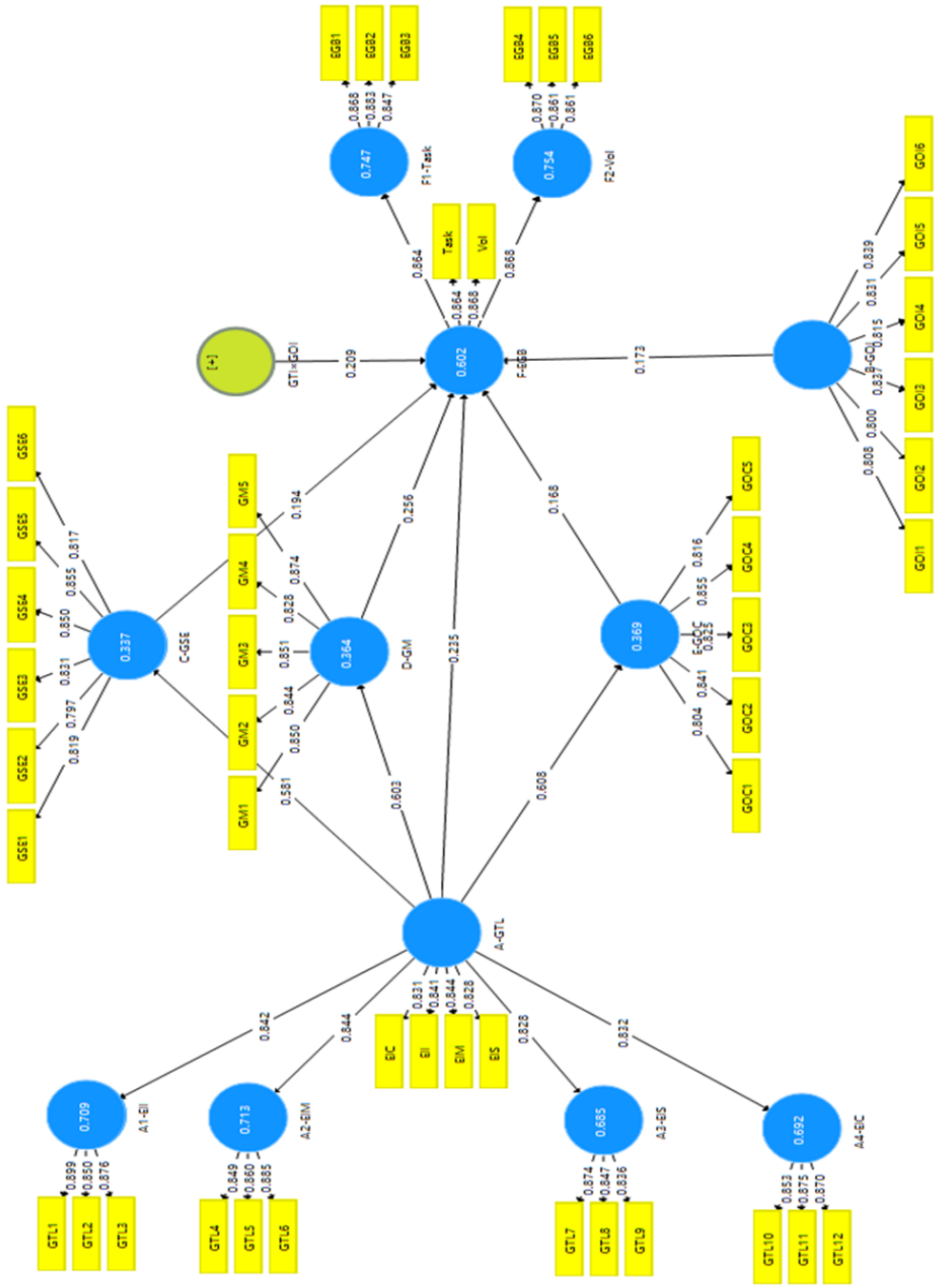

Figure 2. Structural Equation Model

Source: This table is compiled from own editing

Table 6 Table of path coefficients for PLS structural equation modelling

Path	Original sample (O)	Sample average (M)	Standard Deviation (STDEV)	TStatistics (IO/STDEVI)	P Values
A–GTL –> C–GSE	0.581	0.582	0.032	18.295	0.000
A–GTL –> D–GM	0.603	0.603	0.031	19.688	0.000
A–GTL –> E–GOC	0.608	0.609	0.032	18.939	0.000
A–GTL –> F–EGB	0.235	0.233	0.053	4.464	0.000
B–GOI –> F–EGB	0.173	0.174	0.038	4.550	0.000
C–GSE –> F–EGB	0.194	0.195	0.042	4.567	0.000
D–GM –> F–EGB	0.256	0.255	0.043	5.987	0.000
E–GOC –> F–EGB	0.168	0.168	0.043	3.928	0.000
GTI×GOI –> F–EGB	0.209	0.208	0.037	5.662	0.000

Source: *This table is compiled from own editing*

Qualitative Study

In his qualitative study involved interviewing 22 leaders of Guangxi manufacturing enterprises, aged 27–55, with varying academic qualifications. Open–ended questions allowed participants to express their views on factors influencing employees' green behaviors. Data analysis employed word cloud word frequency techniques to identify, label, categorize, generalize, and summarize these factors.

Figure 3. Interview Question Answer Word cloud diagram

Source: This table is compiled from own editing

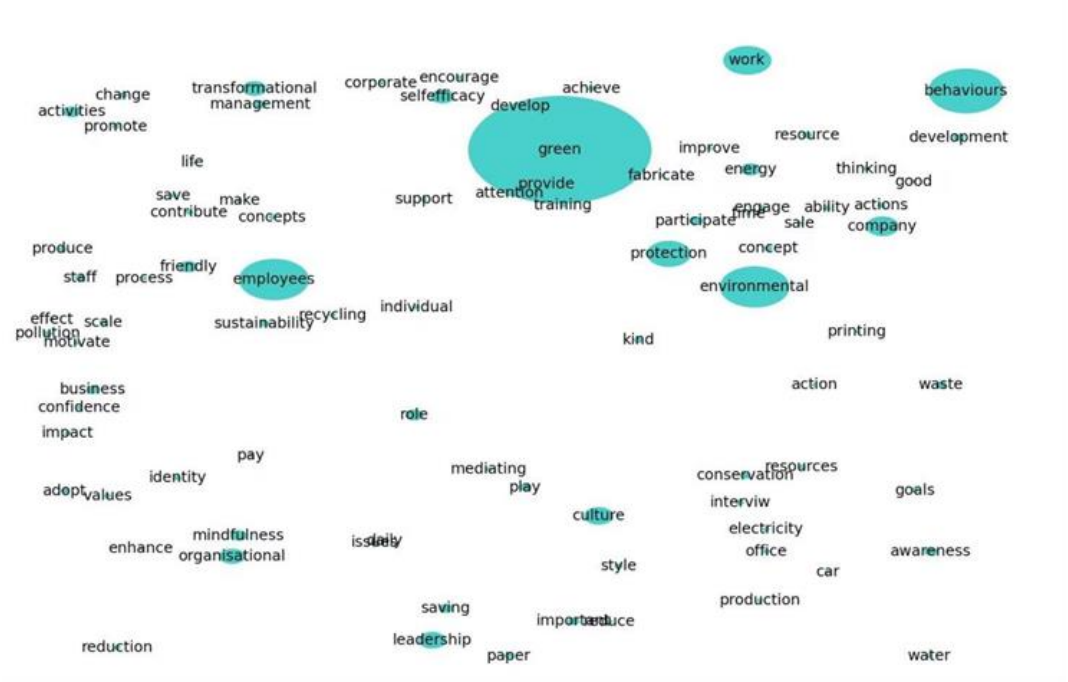

Figure 4. Interview Question Answer Cluster analysis diagram

Source: This table is compiled from own editing

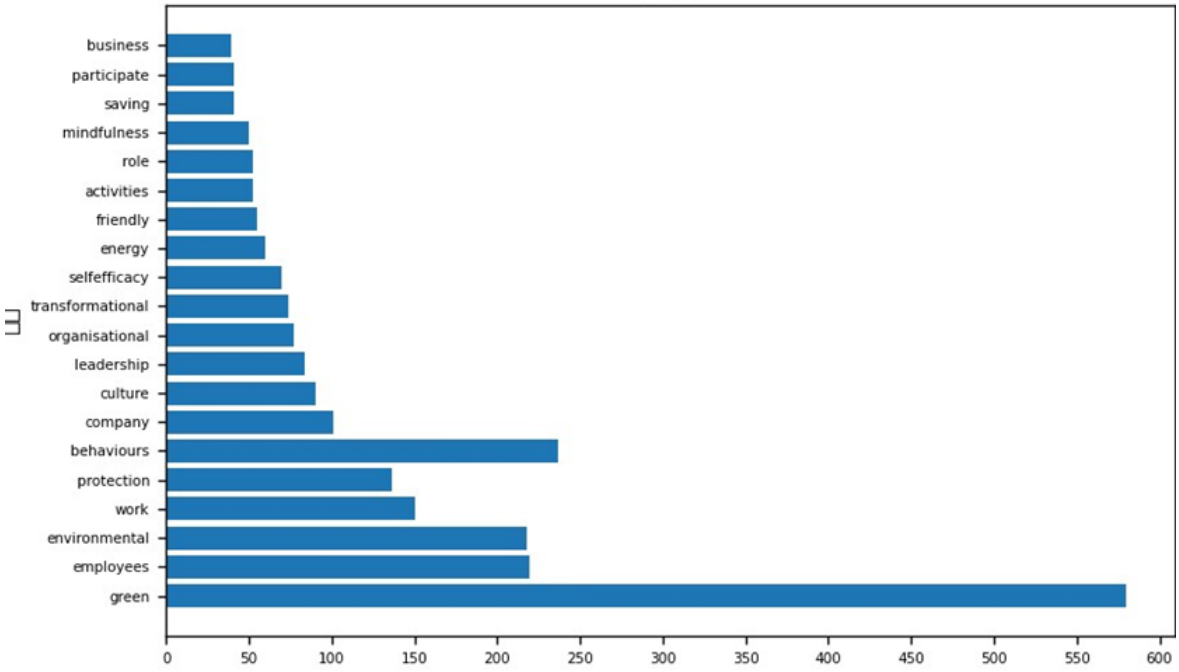

Figure 5. Interview Question Answer Word Frequency diagram

Source: This table is compiled from own editing

The word cloud analysis revealed the most frequently mentioned terms related to green transformational leadership and factors influencing employees' green behavior. The top twenty words and their frequencies are as follows: green (580), environmental (315), behaviors (237), work (150), company (139), protection (136), organizational (132), leadership (118), activities (106), culture (90), energy (80), transformational (74), self–efficacy (70), saving (60), friendly (55), resources (51), mindfulness (50), development (48), sustainability (46), and participate (41).

These keywords suggest that key factors influencing employees' green behavior include green self–efficacy, green mindfulness, green organizational culture, and green organizational identity. Additionally, all 11 research hypotheses proposed in this chapter were supported through content analysis of the interviews.

Discussion

1. Choose a green transformational leader who meets the requirements of green development of the enterprise

A good leader is the communication bridge between the upper organization and the lower–level employees and plays a very crucial role in the process of enterprise strategy implementation (Hu et al., 2013). To implement the enterprise's green development policy, improve the enterprise's green performance as well as mobilize the enthusiasm of employees' green behaviors, the enterprise should give priority to the green transformational leader who meets the requirements of the enterprise's green development when choosing leaders, including recruitment and selection as well as training.

2. Strengthen the training and training of green self–efficacy and green positive thinking traits of leaders.

By strengthening the training of green positive thinking, leaders can not only strengthen their environmental sensitivity but also strengthen the qualities of humility and truthfulness. Leaders can not only take the responsibility of adopting green behaviors to change the perception and attitude of employees, but also communicate with employees as equals, pay attention to their needs, and enhance their satisfaction and willingness to follow, which in turn will lead to more adoption of green behaviors and promote their significance to others, encouraging more green behaviors among people around them

3. Organizations need to pay attention to the construction of a green culture

Organizational culture has a very important impact on organizational performance and individual performance, and companies need to build a good green culture within the organization if they want to achieve the goal of green sustainable development. organizations with a high concentration of green culture, employees are more likely to be aware of the importance of green environmental protection, thus promoting employees to produce green behavior.

4. Leaders should enhance communication with subordinates to promote the formation of good relations between subordinates and superiors.

Leaders and employees are not only the relationship between the supervisor and the subordinate, the influence of the leadership on the staff should not be limited to the hard authority of the influence, more should come from the subordinates of the staff's true identity and love, only so that the organization to form a good green identity atmosphere, the subordinates will be a greater degree of learning the good qualities of the leadership, will be the boss as their own imitation and learning role model, and the leadership of the same behavior, and the leadership to make positive responses to the leadership expectations. Positive response to the expectations of the leadership.

5. Developing performance and reward mechanisms to encourage green behavior among employees

Combined with the company's situation in the organization, the development of appropriate performance and incentive mechanisms to encourage employees to green behavior, because the system is for all employees, covering a wide range, on the one hand, conducive to the formation of the company's green atmosphere, the employees in the appropriate atmosphere, thinking and behavior will be affected by the subtle influence, on the other hand, to enhance the autonomy of the employee's motivation, let the employees of the green behavior is more by their subjective willingness to take rather than forced to request to engage in the behavior. The staff's green behavior is more by their own subjective will, rather than being forced to engage in the behavior of the requirements.

Conclusion

Through 387 valid questionnaires and in-depth interviews with 22 manufacturing employees, drawing on social cognition and social information processing theories, this study empirically tests the impact of green transformational leadership on employees' green behavior.

1. Green transformational leadership has a positive impact on employees' green behavior

The empirical research in this article shows that there is a significant positive correlation between green transformational leadership and employees' green behavior ($p<0.001$), indicating that green transformational leadership effectively promotes the generation of employees' green behavior. Green transformational leaders will combine their green awareness with practical actions, help employees set green environmental goals, encourage employees to break through and challenge themselves, and create unlimited possibilities. Therefore, if leaders in the enterprise agree with green transformational leadership and possess the characteristics of green transformational leadership mentioned above, employees will also actively implement green behavior and respond under the guidance of green transformational leadership.

2. Green transformational leaders indirectly influence employees' green behavior through mediating factors

Green transformational leadership indirectly affects employees' green behavior through the mediating effects of green self-efficacy, green culture, green organizational identity, and green organizational culture. Specifically, the effects are as follows: green self-efficacy (0.147), green mindfulness (0.174), and green organizational culture (0.221). In short, employees' green behavior is the result of specific green transformational leadership. This leadership style plays a central role in promoting green behavior among organizational members. It achieves this by cultivating leaders' green awareness, cultivating green organizational culture, and establishing green organizational identity, all of which collectively affect employees' green concepts, cognition, attitudes, and ultimately their green performance.

3. Green organizational identity plays a positive regulatory role between green transformational leadership and employee green behavior

The higher the level of employee green organization identification, the stronger the impact of green transformational green organizations on employee green behavior. Conversely, a lower

level of employee green organization identification will weaken the impact of green transformational green organizations on employee green behavior. Furthermore, green organizational identity moderates the mediating effect of employee green behavior between green transformational green organizations and employee green behavior. That is, employees with higher levels of green organizational identity will enhance the mediating effect of employee green behavior between green transformational green organizations and employee green behavior.

Suggestion

This study emphasizes the multifaceted nature of green behavior among employees in manufacturing enterprises, however, some limitations in this study point out new directions for future research.

Firstly, it must be acknowledged that data collection is limited to the Guangxi region, which has unique geographical, economic, cultural, and environmental attributes, resulting in a decrease in sample representativeness. Future research can overcome this limitation by expanding the sample size in different regions; Secondly, the complexity of employee green behavior goes beyond the influence of leadership style and internal organizational factors, and future research should consider incorporating these elements into the model; In addition, there are many unexplored research avenues, such as the influence of green organizational atmosphere, employee pressure, and proactive personality traits.

New Knowledge

Figure 6. Green behavior of employees

From: New knowledge

This research delves into the intricate dynamics of environmental sustainability within organizational settings, focusing on the relationship between green transformational leadership and employees' green behavior. By investigating the mediating roles of green self–efficacy, green mindfulness, and green organizational culture, this study contributes significantly to the existing body of knowledge in the following ways.

Firstly, our research advances the understanding of the influence of green transformational leadership on employees' green behavior. By exploring how leaders who prioritize environmental sustainability can positively shape the behavior of their subordinates, we contribute insights into the pivotal role leadership plays in fostering environmentally responsible practices within organizations.

Secondly, the study sheds light on the mechanisms through which green transformational leadership impacts employees' green behavior. The identification and exploration of green self–

efficacy, green mindfulness, and green organizational culture as mediating variables contribute novel perspectives to the field. Understanding how these factors translate leadership principles into actionable green behaviors enriches our comprehension of the complex interplay between leadership and environmental sustainability.

Thirdly, our research unveils the significance of green self-efficacy in the organizational context. By emphasizing individuals' belief in their ability to contribute to environmental sustainability, we underscore the importance of fostering a sense of empowerment among employees. This finding has practical implications for organizational leaders seeking to cultivate a workforce that actively engages in green initiatives.

Fourthly, the study highlights the role of green mindfulness in shaping employees' green behavior. Mindfulness, when applied to environmental concerns, emerges as a potent force in promoting eco-conscious actions. This novel exploration opens avenues for incorporating mindfulness practices into organizational strategies aimed at enhancing sustainability efforts.

Finally, the research underscores the critical role of green organizational culture in driving employees' green behavior. Organizations that embed environmental values into their culture are more likely to witness a positive correlation with employees' eco-friendly actions. This finding underscores the need for organizations to cultivate a holistic green culture that aligns with and reinforces green transformational leadership.

In conclusion, this study contributes valuable insights into the intricate relationships between green transformational leadership, green self-efficacy, green mindfulness, green organizational culture, and employees' green behavior. By unraveling these dynamics, the research offers a nuanced understanding of how organizations can effectively promote environmental sustainability through leadership and organizational practices. The findings of this study provide actionable knowledge for leaders and practitioners seeking to navigate the evolving landscape of sustainable business practices.

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