

Article

Green Transformational Leadership and Green Performance: The Mediation Effects of Green Mindfulness and Green Self-Efficacy

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Abstract: No prior literature explores the influence of green transformational leadership on green performance, thus, this study develops a novel research framework to fill the research gap. This study investigates the influence of green transformational leadership on green performance and discusses the mediation effects of green mindfulness and green self-efficacy by means of structural equation modeling (SEM). The results indicate that green transformational leadership positively influences green mindfulness, green self-efficacy, and green performance. Moreover, this study demonstrates that the positive relationship between green transformational leadership and green performance is partially mediated by the two mediators: green mindfulness and green self-efficacy. It means that green transformational leadership can not only directly affect green performance positively but also indirectly affect it positively through green mindfulness and green self-efficacy. Therefore, firms need to raise their green transformational leadership, green mindfulness, and green self-efficacy to increase their green performance.

Keywords: green performance; green transformational leadership; green mindfulness; green self-efficacy; environmental management

1. Introduction

Environmentalism has become more popular owing to devastating environmental pollution and global warming, so more firms are willing to proactively develop green innovation [1]. Since consumers pay more attention to the prevalence of environmental issues such that consumer environmentalism is more popular in the world [1–3], companies should actively adopt environment management to comply with the environmental trend in order to enhance their green images and competitive advantages [4–6]. Green innovation becomes a powerful competitive weapon, as consumers become more concerned about the environment and green products become more prevalent in the market [7]. Firms could undertake green innovation, not only to make a differentiation strategy, but also to satisfy environmental needs in the market [2,8]. It is necessary for companies to develop an environmental management philosophy to stimulate their green innovation in the environmental era [9,10].

Transformational leaders can provide an inspirational vision, which could motivate their followers to proactively accomplish their own jobs and goals [11]. Additionally, transformational leaders could promote creative ideas within their organizations and their behaviors can act as “creativity-enhancing forces”. Transformational leadership plays a crucial role for the development of innovation [12]. “Green transformational leadership” is defined as “behaviors of leaders who motivate followers to achieve environmental goals and inspire followers to perform beyond expected levels of environmental performance [13]. In this study, we argue that green transformational leadership is an important determinant of green performance. There is no previous research exploring the relationship between green transformational leadership and green performance. The first purpose of this study is to discuss the positive relationship between green transformational leadership and green performance to fill the research gap.

Mindfulness is a receptive attention to and awareness of present events and experience occurring both internally and externally [14]. In the advent of environmentalism, “green mindfulness” is defined as “a state of conscious awareness in which individuals are implicitly aware of the context and content of environmental information and knowledge” [15]. This study asserts that green transformational leaders can inspire followers’ green mindfulness. Thus, this paper argues that green transformational leadership would positively influence green mindfulness, which is positively associated with green performance. The second purpose of this paper is to explore the relationship between green mindfulness and green performance. In addition, self-efficacy refers to beliefs in one’s capabilities to execute and organize courses of action [16]. Under the prevalent green trend, “green self-efficacy” is defined as “the belief in individuals’ capabilities to organize and execute courses of action required to achieve environmental goals” [15]. We posit that green transformational leaders can enhance followers’ green self-efficacy. Hence, this study asserts that green transformational leadership would positively influence green self-efficacy that positively affects to green performance. The third purpose of this paper is to explore the relationship between green self-efficacy and green performance.

We argue that companies have to develop green transformational leadership, green mindfulness, and green self-efficacy to increase green performance. We build up a research framework, which can help companies raise their green performance through its three determinants: green transformational leadership, green mindfulness, and green self-efficacy. Additionally, we further undertake an empirical test to verify the relationships among green transformational leadership, green mindfulness, green self-efficacy, and green performance. The structure of this study is in the following. Literature review

and hypothesis development are explored in Section 2. In addition, we mention the methodology, the sample, data collection, and the measurement of the constructs in Section 3. In addition, the descriptive statistics, correlation coefficients between the constructs, factor analysis, reliability and validity of the measurement, and the results of structural equation modeling (SEM) are reported in Section 4. Furthermore, we describe the conclusions and discussions about the findings, implications, and possible directions for future research in Section 5.

2. Literature Review and Hypothesis Development

2.1. The Positive Effect of Green Transformational Leadership on Green Mindfulness

Transformational leaders can encourage their followers to act beyond immediate self-interests via charisma, individualized consideration, intellectual stimulation, and inspirational motivation [11]. Transformational leadership could facilitate the introduction of new ideas by providing vision, motivation, and intellectual stimulation to followers [17]. “Green transformational leadership” is defined as “behaviors of leaders who motivate followers to achieve environmental goals and inspire followers to perform beyond expected levels of environmental performance [13]. On the other hand, mindfulness is defined as the extent of the attention to detail, the willingness to consider alternatives, and the responsiveness to changes [18]. Ray *et al.* [19] argue that leadership plays an important role to help followers to enhance their mindfulness. Transformational leadership is a leadership style that is beneficial for imprinting organizational mindfulness and influencing mindful organizing [20]. Because transformational leaders could stimulate their employees to develop new ideas, apply their knowledge, and learn novel technology, thus, transformational leadership may both create a context of organizational mindfulness and enable the processes of mindful organizing [20]. The inspirational motivation of transformational leaders can enhance their followers’ meaningfulness, since inspirational motivation can make their followers think and perceive the content and context of their work [21].

Transformational leaders can deliver an inspirational vision, which motivates followers to look beyond the routine activities of their jobs [22]. An inspiring vision can not only show a glorious future but also present how individuals can work towards it in their current jobs [21]. Additionally, transformational leadership can help employees see their work in a larger and more mindful context [20]. Transformational leaders can play a key role in imprinting or altering their followers’ mindfulness [23]. Hence, transformational leadership positively affects mindfulness [24]. We refer to Chen *et al.* [15] to define “green mindfulness” as “a state of conscious awareness in which individuals are implicitly aware of the context and content of environmental information and knowledge”. This study argues that green transformational leadership positively affects green mindfulness and implies the following hypothesis.

- *Hypothesis 1 (H₁). Green transformational leadership is positively associated with green mindfulness.*

2.2. The Positive Effect of Green Transformational Leadership on Green Self-Efficacy

Transformational leaders articulate the vision in a clear manner, explain how to attain the vision, express confidence and optimism, actively communicate norms and beliefs to their followers, and

empower their followers to achieve goals [25]. In addition, transformational leaders could provide adequate reference and ideal points for followers to help them believe that they can successfully overcome the current challenges and influence their behaviors to engage in task-related work successfully [26]. Furthermore, transformational leaders could motivate their followers to increase their followers' willingness to perform beyond expectations [27]. Shamir *et al.* [28] indicate that transformational leadership behavior positively influences followers' self-efficacy through emphasis of positive perception, expectation of excellent performance, and confirmation of outstanding capabilities to achieve desired goals. Kirkpatrick and Locke [29] assert that transformational leaders can build up their followers' self-efficacy by communicating vision and providing sufficient feedback for their followers.

Self-efficacy is defined as the belief in one's capabilities to perform a particular behavior and successfully execute certain actions to attain goals [16]. We refer to Chen *et al.* [15] to define "green self-efficacy" as "the belief in individuals' capabilities to organize and execute courses of action required to achieve environmental goals". Transformational leaders' skills and capabilities as coaching roles could increase self-efficacy [30]. In addition, transformational leaders may increase members' self-efficacy by offering more frequent positive feedback [16]. As a result, transformational leaders can develop their followers' self-efficacy [31]. Transformational leadership might positively affect self-efficacy by setting feasible goals, clarifying standards, developing a collaborative culture, and linking actions of individuals to outcomes [32]. Thus, we argue that green transformational leadership positively influences green self-efficacy and implies the following hypothesis.

- *Hypothesis 2 (H₂). Green transformational leadership is positively associated with green self-efficacy.*

2.3. The Positive Effect of Green Transformational Leadership on Green Performance

Transformational leaders use inspirational motivation and intellectual stimulation, which are critical for organizational innovation [12]. Transformational leaders can stimulate the development of new ideas and encourage their followers to create breakthrough, thus, prior literature has proven that transformational leadership positively influences organizational innovation [33]. Previous literature demonstrates that transformational leaders play a championship role to stimulate successfully innovative concepts within organizations [34]. Transformational leadership is beneficial for the development of new ideas in the innovation process, since transformational leaders act as a catalyst by inspiring followers to consider problems in new ways [34,35]. In addition, transformational leadership involves behavior, which gets followers to think about new ideas [35]. Thus, transformational leadership that encourages team members to conceptualize problems from various viewpoints can enhance team creativity [12].

Because transformational leadership could provide support, encourage followers to view problems from new perspectives, and communicate a vision [36], transformational leadership positively impacts innovation performance [35,37]. Hence, previous research indicates that transformational leadership is positively related to organizational innovation performance [28,32,34,38,39]. Chen *et al.* [40] define "green innovation performance" as the performance of hardware and software involved in the innovation that a company carries out in relations to green products or processes, including the innovation in technologies that are involved in energy-saving, pollution-prevention, waste recycling,

green product designs or corporate environmental management. According to the above statement, we assert that green transformational leadership has a positive effect on green performance and imply the following hypothesis:

- *Hypothesis 3 (H₃). Green transformational leadership is positively associated with green performance.*

2.4. The Positive Effect of Green Mindfulness on Green Performance

Mindfulness includes five elements: openness to novelty, alertness to distinction, sensitivity to different contexts, awareness of multiple perspectives, and orientation in the present [18]. The five components of mindfulness are specifically important for the development of innovation [18]. Fiol and O'Connor [41] argue that the benefits of mindfulness including expanded scanning, context-relevant interpretation, the attention of novel kinds of stimuli and change, appreciating different viewpoints, and taking different viewpoints into account are beneficial for innovation performance. Mindfulness refers to the ability to attend to feedback and more subtle information which emerge from current operations as a basis for efficient adaptation [42]. Since mindfulness could increase the comprehension of complexity and reduce tight coupling among units, there is a positive relationship between mindfulness and creativity [42,43].

Prior literature indicates that there is a positive association between the attentional component of mindfulness and job performance [44]. Herndon [45] suggests that mindfulness is associated with greater attention to external stimuli, and, therefore, better performance. Mindfulness could reduce the likelihood of turnover because it provides a great deal of attention that can improve work-related intelligence and enhance performance [20]. Once employees see their work in a larger and more meaningful context, they are completely engaged in their work and this engagement is beneficial for innovation performance [43]. In addition, mindfulness enables employees to increase the capabilities of problem solving and decision making, enhance skills of interaction and communication, and raise concentration and attention, so mindfulness can enhance innovation performance [46]. Hence, mindfulness would positively affect innovation performance [43]. Based on the above discussion, we argue that green mindfulness would positively affect green performance and propose the following hypothesis:

- *Hypothesis 4 (H₄). Green mindfulness is positively associated with green performance.*

2.5. The Positive Effect of Green Self-Efficacy on Green Performance

Self-efficacy is defined as people's beliefs about their capabilities to produce designated levels of performance [47]. Individuals with a high sense of self-efficacy belief are more likely to have higher levels of performance and higher commitment to their goals [47]. Self-efficacy is associated with a variety of behavioral outcomes such as engagement and persistence [16,48,49]. Self-efficacy can predict several important work-related outcomes and task performance [16,31,50]. High level of self-efficacy is related to the effective extent of goal setting, positive thinking and feeling, and self-regulation [47,51].

Employees who perceive themselves as highly efficacious would activate sufficient effort, which could produce outstanding outcomes [50]. Prior literature has demonstrated the importance of self-efficacy for improving performance [31]. Individuals with higher level of self-efficacy are likely to have higher belief in their own ability to make new products and ideas [52]. People with a strong sense of self-efficacy can result in more creativity behavior. Hence, there is a positive relationship between self-efficacy and innovation performance [53–55]. Based on the above discussion, we argue that green self-efficacy would positively affect green performance and propose the following hypothesis:

- *Hypothesis 5 (H₅). Green self-efficacy is positively associated with green performance.*

2.6. The Mediation Effect of Green Mindfulness

Mindfulness refers to members' rich awareness of discriminatory detail and a capacity for action [56]. Mindfulness reflects the awareness of inherent tendency of humans and, thus, can be one effective means to better resist negative implications of bandwagon phenomena [18]. Thus, mindfulness could be thought as a way for organizations to overcome uncertain situations of high volatility that would lead to disastrous negative consequences [42]. Mindfulness is a state of active awareness and openness to new information that enables members to pay attention in the continuous creation, refinement, and learning [18]. Organizations have to build up a systematic process for developing mindfulness to operate in dynamic, ambiguous and unpredictable situations, since mindfulness is a vital component for organizations to survive in the exposure to crisis and change [56]. If members are able to "mindfully" comprehend the strategic implications of the organization, the organizational performance would be better. Organizational performance depends on the members' ability of taking responsibility and decision making that is shown to be influenced by mindfulness [41]. Mindfulness is one kind of essential attitude that can help members take into account the complexity and uncertainty linked to their decision-making. Prior research indicates that mindfulness has a positive effect on learning and creative thinking [18]. Because mindful behaviors could facilitate socially relevant transactions by creating an atmosphere of open-mindedness, engagement, and flexibility, mindfulness has a significant effect on organizational performance [29]. Although green transformational leadership is a crucial driver for green performance, green mindfulness plays a mediation role between them. Besides a direct causal relationship between green transformational leadership and green performance, we hypothesize that green transformational leadership influences the mediator, green mindfulness, which in turn influences green performance according to Hypothesis 1 (H₁) and Hypothesis 4 (H₄). Thus, we argue that green mindfulness mediates the positive relationship between green transformational leadership and green performance, and propose the following hypothesis:

- *Hypothesis 6 (H₆). Green mindfulness mediates the positive relationship between green transformational leadership and green performance.*

2.7. The Mediation Effect of Green Self-Efficacy

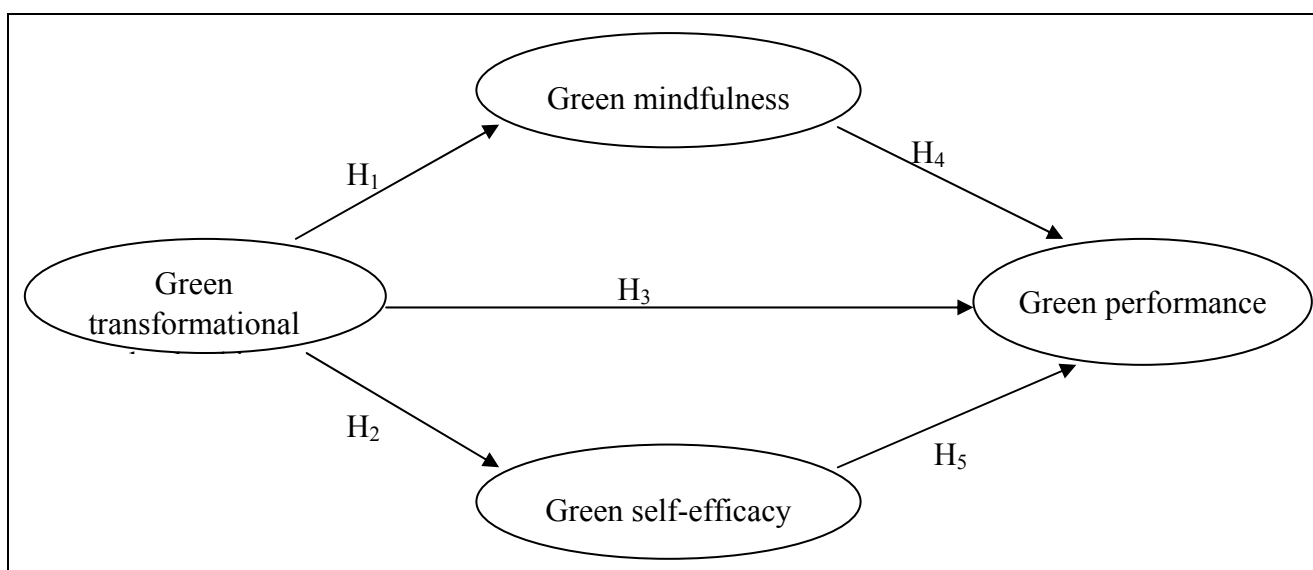
Self-efficacy is people's self-judgment in their capabilities to perform a particular task. Level of self-efficacy is evaluated by persons' confidence in their abilities to accomplish job expectations [47]. Self-efficacy has been widely considered as a key determinant of several aspects of behaviors including

levels of task persistence, aspiration, positive thinking and feeling, and task performance [16,31]. According to social cognitive theory, employees with a high level of self-efficacy are more likely to have higher levels of performance and higher commitment to remain task-focused and to tolerate failure [50]. In addition, individuals with high self-efficacy are more likely to persist and retain high aspiration to their goals [31]. High self-efficacy is related to more cognitive flexibility via the effective use of goal setting, positive feedback, and self-inspiration [47,51]. A high level of self-efficacy can help individuals maintain their efforts for goal attainment [52]. People with higher level of self-efficacy are more likely to have higher belief in their own abilities to complete tasks and ideas and accordingly may perform higher outcomes [53–55]. Although green transformational leadership is an important factor for green performance, green self-efficacy plays a mediation role between them. In addition to a direct causal relationship between green transformational leadership and green performance, we hypothesize that green transformational leadership affects the mediator, green self-efficacy, which eventually affects green performance according to Hypothesis 2 (H_2) and Hypothesis 5 (H_5). Thus, we argue that green self-efficacy has a mediation effect between green transformational leadership and green performance in this research, and propose the following hypothesis:

- *Hypothesis 7 (H_7). Green self-efficacy mediates the positive relationship between green transformational leadership and green performance.*

We posit that green transformational leadership positively affects green performance. Additionally, we argue that green mindfulness and green self-efficacy partially mediate the positive relationship between green transformational leadership and green performance. It means that green transformational leadership can not only directly influence green performance positively, but also indirectly influence it positively through green mindfulness and green self-efficacy. The antecedent of the research framework is green transformational leadership and the consequent is green performance, while green mindfulness and green self-efficacy are two partial mediators. The research framework is reported in Figure 1.

Figure 1. Research framework.



3. Methodology and Measurement

3.1. Data Collection and the Sample

This research uses the questionnaire survey to test the hypotheses in the Taiwan's electronics industry. Taiwanese electronics companies face the enormous impact of environmental laws, such as Kyoto Protocol, Waste Electronics and Electrical Equipment (WEEE) Directive, Integrated Product Policy (IPP) Directive, Restriction of the Use of Certain Hazardous Substances in EEE (RoHS) Directive, and Energy Using Product (EuP) Directive. Thus, Taiwanese electronics companies need to develop green performance to satisfy their customers' environmental desires. It is worth exploring how Taiwanese electronics companies enhance their green performance via green transformational leadership, green mindfulness, and green self-efficacy. The sample of questionnaire survey was randomly selected from "Business Directory of Taiwan" of Business Express Co., Ltd. (Taipei, Taiwan). The respondents of the questionnaires are managers of R&D departments, and leaders and members of green innovation projects in the Taiwanese electronics companies. To improve the valid response rate, the research assistants of this study called to every Taiwanese electronics company that was sampled, confirmed the names and job titles of the respondents, and explained the research objectives and the questionnaire content before questionnaire mailing. The respondents were asked to return the completed questionnaires within two weeks through mailing.

We refer to the past literature to design questionnaire items. Before mailing to the respondents, eight scholars and experts were asked to modify the questionnaire in the first pretest. Then, the questionnaires were randomly mailed to twelve managers of R&D departments, and leaders and members of green innovation projects in different Taiwanese electronics companies and they were asked to fill in the questionnaire and identify the ambiguities in terms, meanings, and issues in the second pretest. High content validity is a necessary requisition for the questionnaire in this study. Socially desirable bias (SDB), which refers to the inclination of respondents to fill in questionnaires in a way that is eager to meet the expectation of other people, would affect the validity of questionnaire survey [57]. We refer to Chen and Chang [57] to use the three ways that include anonymity, promising of confidentiality, and asking to be honest in the questionnaire survey to avoid SDB.

To avoid common method variance (CMV), the respondents of different constructs in this study are different. This study asked every randomly selected Taiwanese electronics company to point out a specific green innovation project which is most important for the company. Then, every respondent was asked to regard this green innovation project as the focal one to evaluate its project leader's "green transformational leadership", its project members' "green mindfulness" and "green self-efficacy", and its "green performance". The respondents of "green transformational leadership" are members of green innovation projects, and they are asked to evaluate their project leader's green transformational leadership. The respondents of "green mindfulness" are leaders of green innovation projects, and they are asked to evaluate their project members' green mindfulness. The respondents of "green self-efficacy" are members of green innovation projects, and they are asked to evaluate their green self-efficacy. The respondents of "green performance" are managers of R&D departments, and they are asked to evaluate green performance of the green innovation project. Eight hundred questionnaires were sent to the selected companies. There are 262 valid questionnaires, and the effective response rate is 32.75%.

3.2. The Measurement of the Constructs

The measurement of the questionnaire items in this study is by means of “seven-point Likert scale from 1 to 7” rating from strongly disagreement to strongly agreement. The measurements of the constructs in this study are described in the following:

Green transformational leadership. The respondents of “green transformational leadership” are members of green innovation projects, and they are asked to evaluate their project leader’s green transformational leadership. Furthermore, we refer to Chen and Chang [13] to measure green transformational leadership, and its measurement includes six items: (1) The leader of the green innovation project inspires the project members with the environmental plans; (2) the leader of the green innovation project provides a clear environmental vision for the project members to follow; (3) the leader of the green innovation project gets the project members to work together for the same environmental goals; (4) the leader of the green innovation project encourages the project members to achieve the environmental goals; (5) the leader of the green innovation project acts with considering environmental beliefs of the project members; and (6) the leader of the green innovation project stimulates the project members to think about green ideas.

Green mindfulness. The respondents of “green mindfulness” are leaders of green innovation projects, and they are asked to evaluate their project members’ green mindfulness. Furthermore, we refer to Chen *et al.* [15] to measure green mindfulness, and its measurement includes six items: (1) The members of the green innovation project feel free to discuss environmental issues and problems; (2) the members of the green innovation project are encouraged to express different views with respect to environmental issues and problems; (3) the members of the green innovation project pay attention to what is happening if unexpected environmental issues and problems arise; (4) the members of the green innovation project are inclined to report environmental information and knowledge that have significant consequences; (5) the members of the green innovation project are rewarded if they share and announce new environmental information and knowledge; and (6) the members of the green innovation project know what is readily available for consultation if unexpected environmental issues and problems arise.

Green self-efficacy. The respondents of “green self-efficacy” are members of green innovation projects, and they are asked to evaluate their green self-efficacy. In addition, we refer to Chen *et al.* [15] to measure green self-efficacy and its measurement includes six items: (1) We feel we can succeed in accomplishing environmental ideas; (2) we can achieve most of environmental goals; (3) we feel competent to deal effectively with environmental tasks; (4) we can perform effectively on environmental missions; (5) we can overcome environmental problems; and (6) we could find out creative solutions to environmental problems.

Green performance. The respondents of “green performance” are managers of R&D departments, and they are asked to evaluate green performance of the green innovation project. This research refers to Chen *et al.* [40] to measure green performance. The measurement of green performance includes eight items: (1) The green innovation project chooses the materials of the product that produce the least amount of pollution for conducting the product development or design; (2) the green innovation project chooses the materials of the product that consume the least amount of energy and resources for conducting the product development or design; (3) the green innovation project uses the fewest amount

of materials to comprise the product for conducting the product development or design; (4) the green innovation project would circumspectly deliberate whether the product is easy to recycle, reuse and decompose for conducting the product development or design; (5) the operation process developed by the green innovation project effectively reduces the emission of hazardous substances or waste; (6) the operation process developed by the green innovation project recycles waste and emission that allow them to be treated and re-used; (7) the operation process developed by the green innovation project reduces the consumption of water, electricity, coal or oil; and (8) the operation process developed by the green innovation project reduces the use of raw materials.

4. Empirical Results

4.1. The Results of the Measurement Model

There are three types of respondents in this study—“project leaders” who rate green mindfulness, “project members” who rate green transformational leadership and green self-efficacy, and “R&D managers” who rate green performance. This study describes the profile of the three types of respondents in Table 1. In addition, the means, standard deviations, and correlation matrix are reported in Table 2. In Table 2, there are positive correlations among the four constructs: green transformational leadership, green mindfulness, green self-efficacy, and green performance. The factor analysis of the four constructs is shown in Table 3. Each construct in this paper can be classified into only one factor. We refer to the prior research to design questionnaire items. Prior to mailing to the respondents, we apply two pretests for the questionnaire revision. Thus, the measurement of this study is acceptable in content validity. In addition, there are two approaches to confirm the reliability of the measurement. Firstly, one measure of the reliability is to evaluate the loadings of every constructs’ individual items. With respect to the quality of the measurement model, the loadings (λ) of all items of the four constructs reported in Table 4 are significant. Secondly, Cronbach’s α is the other measure of the reliability. Table 4 lists Cronbach’s α of the four constructs. In general, the minimum requirement of Cronbach’s α coefficient is 0.7 [58]. In Table 4, the Cronbach’s α coefficient of “green transformational leadership” is 0.902; that of “green mindfulness” is 0.910; that of “green self-efficacy” is 0.905; that of “green performance” is 0.915. Because the Cronbach’s α coefficients of all constructs are more than 0.7, the reliability of the measurement in this study is acceptable.

Table 1. The profile of the three types of respondents.

Type of Respondents	Number of Respondents	Number of Female Respondents	Number of Male Respondents	Average Age	Average Years of Work Experience
Project leaders	262	59	203	43.8	18.6
Project members	262	117	145	31.5	7.4
R&D managers	262	32	230	51.3	25.7

Table 2. Means, standard deviations and correlations of the constructs.

Constructs	Mean	Standard Deviation	A.	B.	C.
A. Green transformational leadership	5.186	0.782			
B. Green mindfulness	5.202	0.779	0.345 *		
C. Green self-efficacy	5.193	0.761	0.360 **	0.349 *	
D. Green performance	5.188	0.770	0.351 *	0.359 *	0.352 *

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

Table 3. Factor analysis of this study.

Constructs	Number of Items	Number of Factors	Accumulation Percentage of Explained Variance
Green transformational leadership	6	1	62.0%
Green mindfulness	6	1	63.2%
Green self-efficacy	6	1	60.6%
Green performance	8	1	64.6%

Table 4. The items' loadings (λ) and the constructs' Cronbach's α coefficients and AVEs.

Constructs	Items	λ	Cronbach's α	AVE	The Square Root of AVE
Green transformational leadership	GTL1	0.810	0.902	0.725	0.851
	GTL2	0.825 **			
	GTL3	0.813 **			
	GTL4	0.831 **			
	GTL5	0.825 **			
	GTL6	0.836 **			
Green mindfulness	GM1	0.789	0.910	0.736	0.858
	GM 2	0.792 **			
	GM 3	0.805 **			
	GM 4	0.773 **			
	GM 5	0.813 **			
	GM 6	0.786 **			
Green self-efficacy	GSE1	0.795	0.905	0.722	0.850
	GSE2	0.806 **			
	GSE3	0.810 **			
	GSE4	0.785 **			
	GSE5	0.773 **			
	GSE6	0.804 **			
Green performance	GIP1	0.801	0.915	0.731	0.855
	GIP2	0.793 **			
	GIP3	0.789 **			
	GIP4	0.806 **			
	GIP5	0.788 **			
	GIP6	0.779 **			
	GIP7	0.801 **			
	GIP8	0.805 **			

Note: ** $p < 0.01$.

There are two approaches to confirm the construct validity of the measurement. Firstly, we use Fornell and Larcker's measure of average variance extracted (AVE) to assess the discriminant validity of the measurement [59]. The AVE measures the amount of variance captured by the construct through its items relative to the amount of variance due to the measurement error. To satisfy the requirement of the discriminant validity, the square root of a construct's AVE must be greater than the correlations between the construct and the other ones in the model. For example, the square roots of the AVEs for the two constructs, green transformational leadership and green performance, are 0.851 and 0.855 in Table 4 that are higher than the correlation, 0.351, between them in Table 2. It indicates that there is adequate discriminant validity between the two constructs. The square roots of all constructs' AVEs in Table 4 of this study are all higher than the correlations among all constructs in Table 2. Hence, the discriminant validity of the measurement in this study is acceptable. Secondly, if the AVE of a construct is higher than 0.5, it means that the convergent validity of the construct is acceptable. In Table 4, the AVEs of the four constructs are 0.725, 0.736, 0.722, and 0.731, which are all higher than 0.5. It demonstrates that the convergent validity of the measurement is acceptable. Based on the above results, the reliability and validity of the measurement in this study are acceptable.

4.2. The Results of the Structural Model

We apply structural equation modeling (SEM) to verify the hypotheses and apply AMOS 17.0 to obtain the empirical results. Table 5 shows the results of the structural model in this study. The overall fit measures of the full model in the SEM indicate that the fit of the model is acceptable (GFI = 0.902, RMSEA = 0.047, NFI = 0.912, CFI = 0.916). All of the paths estimated are significant, and all hypotheses are supported in this study. Adding more paths in the research framework would not significantly improve the fit measures. The residuals of the covariance are small and center near 0. The results of the full model in this study are shown in Figure 2. All five paths estimated are significantly positive. Therefore, H₁, H₂, H₃, H₄, and H₅ are all supported in this study. We find out that the increase of green transformational leadership can not only help companies to comply with both of the strict international environmental regulations and the popular consumer environmentalism, but also enhance green performance. We demonstrate that green transformational leadership is a crucial driver of green performance. H₃ is supported in this study, thus, there is a direct positive relationship between green transformational leadership and green performance. In addition, since H₁ and H₄ are supported in this study, we find out that green transformational leadership influences the mediator, green mindfulness, which in turn influences green performance. We prove that green mindfulness partially mediates the positive relationship between green transformational leadership and green performance. Thus, H₆ is supported in this study. Moreover, because H₂ and H₅ are supported in this study, we point out that green transformational leadership affects the mediator, green self-efficacy, which in turn affects green performance. We prove that green self-efficacy partially mediates the positive relationship between green transformational leadership and green performance. Thus, H₇ is supported in this study. The mediation model in this study is used to clarify the mechanism which underlies a specific relationship between green transformational leadership and green performance via green mindfulness and green self-efficacy, known as mediators. Rather than hypothesizing a direct causal relationship between green transformational leadership and green performance, a mediational model hypothesizes that green

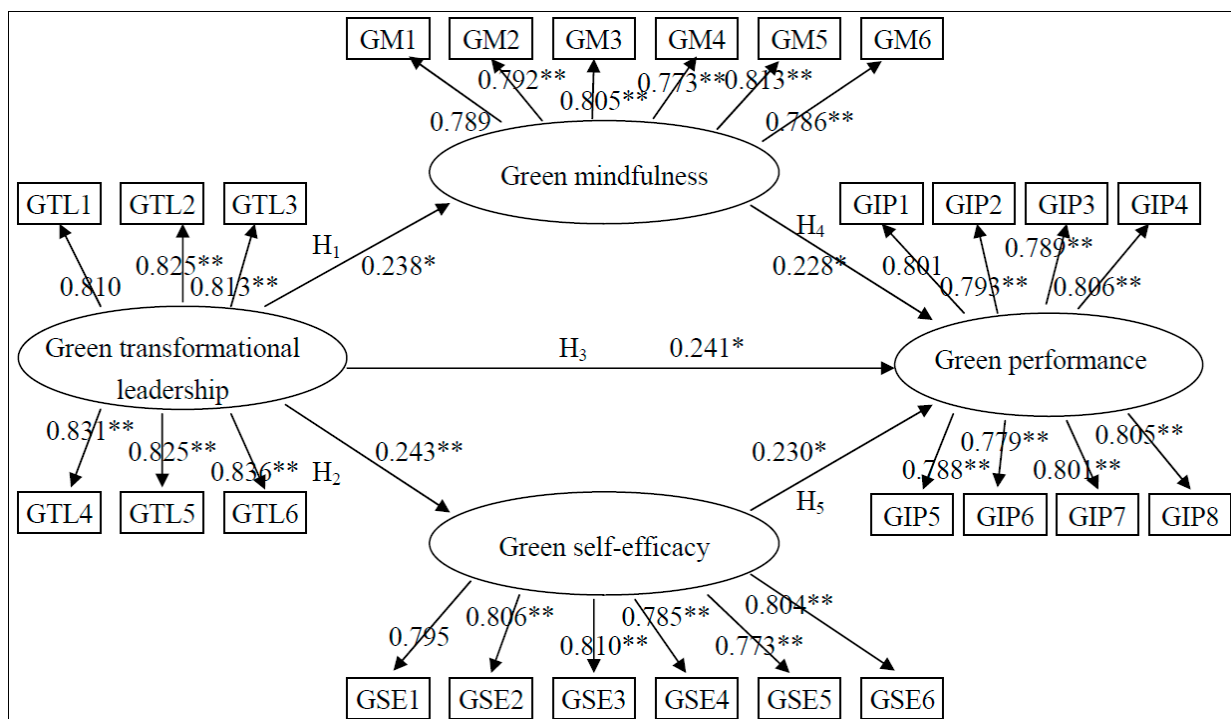
transformational leadership influences the two mediators, green mindfulness and green self-efficacy, which in turn influence green performance. Hence, the two mediators, green mindfulness and green self-efficacy, serve to explicate the nature of the relationship between green transformational leadership and green performance. Partial mediation relationships occur when the two mediators, green mindfulness and green self-efficacy, play an important role in governing the relationship between green transformational leadership and green performance. It means that green transformational leadership can not only directly affect green performance positively, but also indirectly affect it positively via green mindfulness and green self-efficacy. Based on the above research results, we suggest that companies should raise their green transformational leadership, green mindfulness, and green self-efficacy to enhance their green performance to satisfy their customers' environmental needs.

Table 5. Measures of Overall Model Fit.

Hypothesis	Proposed Effect	Path Coefficient	Results
H ₁	+	0.238 *	H ₁ is supported
H ₂	+	0.243 **	H ₂ is supported
H ₃	+	0.241 *	H ₃ is supported
H ₄	+	0.228 *	H ₄ is supported
H ₅	+	0.230 *	H ₅ is supported

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

Figure 2. The results of the full model.



GFI = 0.902, RMSEA = 0.047, NFI = 0.912, CFI = 0.916; Note: * $p < 0.05$; ** $p < 0.01$.

5. Conclusions and Implications

We summarize the literature on transformational leadership, green mindfulness, green self-efficacy, and green management into a new managerial framework of green performance. The literature is not

conclusive on how to enhance green performance in an integrated framework from leadership perspective under the context of environmentalism. Thus, we provide an approach of green transformational leadership to improve green performance in the environmental era. Furthermore, we develop a research framework of green performance to discuss its relationships with green transformational leadership, green mindfulness, and green self-efficacy. The empirical results show that green transformational leadership positively relate to green mindfulness, green self-efficacy, and green performance. In addition, we find out that the positive relationship between green transformational leadership and green performance is partially mediated by the two mediators: green mindfulness and green self-efficacy. All hypotheses proposed in this study are supported. Therefore, investing resources in the increase of green transformational leadership, green mindfulness, and green self-efficacy is helpful to increase green performance.

The main purpose of this paper is to explore the relationship between green transformational leadership and green performance and to examine the partial mediation effects of green mindfulness and green self-efficacy. Companies have to increase their green transformational leadership, green mindfulness, and green self-efficacy in order to raise their green performance. A useful starting point for companies is to develop green transformational leadership to improve green performance. In addition, green mindfulness is crucial to determine green performance. Companies need to enhance the green mindfulness of their employees, since green mindfulness would mediate the positive relationship between green transformational leadership and green performance. Furthermore, green self-efficacy is critical to determine green performance. Companies need to enhance the green self-efficacy of their employees, because green self-efficacy would mediate the positive relationship between green transformational leadership and green performance.

If firms would like to develop green performance successfully, they should incorporate the concepts of green transformational leadership, green mindfulness, and green self-efficacy with the activities of green innovation projects. There are four academic contributions in this study. First, we combine the concepts of transformational leadership, mindfulness, self-efficacy, and green management to propose a research framework of green performance. Second, we develop a framework to enhance green performance. We prove that green transformational leadership positively influences green performance. Third, we demonstrate that green mindfulness and green self-efficacy partially mediate the positive relationship between green transformational leadership and green performance. Fourth, this paper extends the research of transformational leadership, mindfulness, self-efficacy, and innovation into the field of green management.

There are six practical contributions in this study. First, we prove that enhancing green transformational leadership can not only increase both of green mindfulness and green self-efficacy, but also raise green performance. If companies would like to enhance their green performance, they should integrate the ideas of green transformational leadership, green mindfulness, and green self-efficacy into the process of green innovation development. Second, in a more sophisticated context of innovation development, it is worth educating experienced leaders of green innovation projects to increase green transformational leadership, green mindfulness, and green self-efficacy in order to raise green performance. Third, companies need to enhance green mindfulness of their employees, since there is a significant mediation effect of green mindfulness according to the results of this study. We find out that green transformational leadership can not only directly influence green performance positively but also indirectly influence it

positively via green mindfulness. Fourth, firms need to increase green self-efficacy of their employees, because there is a significant mediation effect of green self-efficacy in this study. We prove that green transformational leadership can not only directly affect green performance positively but also indirectly influence it positively through green self-efficacy. Fifth, since green innovation has become an effective approach to develop differentiation and positioning strategies nowadays, firms should exploit green innovation to differentiate and to position their products to seize green opportunities. Thus, firms have to diffuse the concepts of green transformational leadership, green mindfulness, and green self-efficacy in their long-term strategy planning to improve their green performance. Sixth, this study also provides practical contributions to policy makers in the government. Although profit maximization is the major goal for top managers, policy makers could introduce relevant environmental regulations to encourage the top managers to enhance their green transformational leadership, which can raise their firms' green performance. In addition, policy makers can invest resources in the development of environmentalism in order to help companies to increase their employees' green mindfulness and green self-efficacy that are positively related to green performance.

We propose three directions with regard to future research in the study. First, we pay attention on the electronics industry of Taiwan. Future research can pay attention on other industries and compare with this study. Second, we concentrate on Taiwan's companies. Future research can concentrate on other countries' companies and compare with this study. Third, we verify the hypotheses by means of questionnaire survey, which only provides cross-sectional data so that we can't explore the dynamic change of green transformational leadership, green mindfulness, green self-efficacy, and green performance in the different stages. Thus, future research can concentrate on the longitudinal study to investigate the differences of green transformational leadership, green mindfulness, green self-efficacy, and green performance in the different stages. We hope that the research results are beneficial for managers, researchers, practitioners, and policy makers, and contribute to future research as reference.

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Author Contributions

Yu-Shan Chen initiated the project and conceptualized the paper. Ching-Hsun Chang analyzed the data and completed the paper in English. Yu-Hsien Lin made contributions in data collection and writing material.

Conflicts of Interest

The authors declare no conflict of interest.

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