

Article

How Managers' Green Transformational Leadership Affects a Firm's Environmental Strategy, Green Innovation, and Performance: The Moderating Impact of Differentiation Strategy

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Abstract: No prior literature has investigated the effect of managers' green transformational leadership (GTL) on financial performance (FP). The current study introduces an original research framework with the aim of filling in this gap. This study introduces a completer analytical framework by considering the direct impacts of managers' GTL on FP and the indirect impacts of managers' GTL under the joint action of corporate environmental strategy (CES), green product innovation (GPT), and green process innovation (GPI). Furthermore, based on the question of how enterprises can earn profit from GPT, analyzing the moderator impact of differentiation strategy on the relationship between GPT and FP is also within the context of the present study. The data collected from 315 firms with the ISO 14001 certificate in the First and Second 500 Industrial Enterprises List of Turkey in 2018 were tested in the SmartPLS 3 analysis program. The empirical evidence shows that managers' GTL affects FP both directly and indirectly through CES and GPI. However, it is concluded that GPT does not have a direct positive impact on FP. Considering GPT and differentiation strategy jointly, it is observed that its relationship with FP is positive and significant.

Keywords: green transformational leadership; corporate environmental strategy; green innovation; differentiation strategy; financial performance



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1. Introduction

The results reported by the Global Footprint Network (2019) show that natural resources offered for consumption by the world in a year are consumed in less than seven months [1]. These overruns in consumption cause greenhouse gas emissions [2]. The manufacturing industry, which is the primary sector spreading pollution and consuming resources, is responsible for one-third of greenhouse gas emissions in the world [3]. At this point, the question of how the manufacturing industry can maintain its activities in an environmentally friendly and profitable way gains importance. Considering the existing business practices, green innovation (GI) is a novel way to solve environmental challenges. Therefore, manufacturing firms should unify the environmental management philosophy with GI practices to decrease their adverse impacts on the natural environment [4].

GI is the innovation of green processes and products, involving technology innovations in pollution prevention, energy saving, waste recycling, green product designs, and corporate environmental management. GI consists of GPT and GPI. GPT is associated with product innovation, including environmentally friendly products and packaging, product recovery, recycling, and eco-labeling [5]. GPI denotes a firm's ability to improve the current production processes and develop novel processes that ensure energy saving and prevent pollution [6].

At this point, how manufacturing industries can improve their GI capabilities becomes important. In line with the resource-based view (RBV), firms can obtain competitive

advantages by creating rare, valued, non-substitutable, and inimitable resources and capabilities [7]. Leaders with effective characteristics in this sense are a unique resource for a firm to reach its goals and obtain competitive advantages [8]. It has been emphasized that especially environmentally responsible leaders tend toward the GTL style more [9]. GTL is a behavior style that motivates its followers to reach their environmental objectives and inspires them to exhibit performance above the expected environmental levels [10]. Scholars have discussed the positive effect of firm managers on environmental performance [11,12] but have ignored a manager's leadership factor. Hart (1995) [13] presented the natural-resource-based view (NRBV) by including environmental issues in the RBV. The NRBV emphasizes that competitive advantages originate from the capabilities that facilitate sustainable environmental activities. NRBV-based GTL behavior is one of the main internal resources of corporate environment management [8] and may improve GPI and GPT capability [14].

On the other hand, it has been emphasized that firms should develop strategies to carry out innovations, and thus, they can minimize the adverse effects of their activities on the environment [15]. Hart and Dowell (2011) [16] highlight the importance of CES for firms to maintain their existence and perform better. Huang et al. (2021) [17] suggest that investigating the main antecedents of CES is an urgent need. Firm management considerably affects strategy, culture, systems, and applications. Therefore, managers with the GTL style can promote CES adaptation using internal and external resources [18]. However, the literature has not sufficiently researched the important role of GTL [17].

After all, innovation is generally costly. Therefore, the main problem is whether GI can enhance growth [19]. According to Stucki (2019) [20], firms can only invest in green technologies if they bring profit. Whether environmentally friendly technology investments can increase FP is important at this point. Palmer, Oates, and Portney (1995) [21] argue that firms dealing with GI can be unproductive and incur efficiency losses. Some studies reveal that GI can increase FP [22,23]. The association of GI with FP is still inconclusive and sensitive to the sample choice, empirical design, and analysis method [3,19].

This study examines four main research questions by unifying the NRBV and the market-based view (MBV). First, *"Does managers' GTL affect the firm's CES, GPT, GPI capability, and FP?"* Concerning the importance of this question, we aimed to present a complete analytical framework considering the direct influence of managers' GTL on FP and the indirect influence under the joint action of CES, GPT, and GPI of managers' GTL. The review of the relevant literature shows that the impact of GTL behavior on FP has not been analyzed. In this sense, this study can contribute significantly to newly developing GTL literature and GTL practice by discussing, through the NRBV, the role of managers' GTL in the Turkish manufacturing sector in using corporate capabilities and resources to promote CES, GPT, and GPI and improve FP.

Moreover, most present studies have examined either (only) GPT or GPI or have evaluated GI on a large scale without describing GPT and GPI. Whereas some researchers indicate GPI as a precursor of GPT [24], others state GPT as a precursor of GPI [25]. As a result, GPI can form a basis for GPT since it provides systematic improvements in all operational and managerial processes [26]. The second research question of this study, aware of these inconsistent findings, is as follows: *"Does GPI affect GPT?"*

However, every innovation type (product and process) can naturally obtain various performance results. Thus, research on GI could not obtain consistent findings, and the relationship between GI and FP remains a moot point [27,28]. Researchers call for the necessity to conduct more research [3]. The third research question of the current study, aware of the gap in the existing studies, is as follows: *"Do GPT and GPI capability affect FP?"*

Some researchers have found that GPT provides firms with a competitive advantage [29]. However, other studies have shown a negative or insignificant effect of GPT on FP [30]. These complicated findings invite the question of how firms can profit from their efforts on the GPT issue. Although GPT can create value for firms, it may be necessary for firms to have a suitable strategy to obtain this potential value [31]. According to the MBV, the market is the focal point for firms to compete [32], and firms can increase their firm values

by positioning their products in the market differently [33]. According to the effects of the literature on competitive strategy, it is expected that firms' differentiation strategy shapes the way they benefit from/use the resources obtained from GPT [34]. Thus, the effect of GPT capability on FP may depend on a firm's differentiation strategy. Hence, to reveal the complexity of the correlation between GPT and FP, it is required to analyze the moderator role of differentiation strategy in FP enhancement. The fourth research question of the current study, aware of the gap in the existing studies, is as follows: "Does the interaction of GPT and differentiation strategy affect FP?" The current research provides a possible perspective to explain the present incoherent research results about the GPT and FP connection by analyzing the moderator role of differentiation strategy in FP enhancement and thus contributes to theory and practice. In this context, the data collected from 315 firms with the ISO 14001 certificate in the First and Second 500 Industrial Enterprises List of Turkey in 2018 were tested in the SmartPLS 3 analysis program.

2. Theoretical Framework and Hypotheses

2.1. GTL and CES

CES is a proactive environmental strategy that can decrease the influence of operations on the natural environment via processes, products, and corporate policies, by decreasing energy consumption and waste and utilizing renewable resources [35]. Hart (1995) [13] states that firms with a common vision capability can develop the necessary capabilities to improve CES earlier than firms without it. At the same time, cooperation and coordination of different departments on environmental initiatives and actions are necessary, and these kinds of initiatives are easier when approved by the top management. If managers have a strong commitment and regard environmental issues as an opportunity, there is a higher possibility that firms have CES [36]. The literature demonstrates that the transformational leadership style is effective at the individualistic and organizational levels when displayed by the top management [37].

Managers with the GTL style may utilize internal and external resources to promote the adoption of CES. They can transmit a clear environmental vision on corporate environmental responsibility issues, express the value and significance of environment management, and be more cohesive and appealing when sharing information. Hence, they can include environmental issues in corporate strategic planning [12]. A few researchers have indicated a possible relationship between GTL and CES [12,17,38]. However, since these studies were conducted with data from firms in China, this may limit the generalization of results. The low number of studies addressing the connection between GTL and CES is surprising; thus, this study uses managers' GTL as a precursor of CES. Accordingly, we posit that:

Hypothesis 1 (H1). *Managers' GTL positively impacts CES.*

2.2. GTL, GPT, and GPI

GI inevitably consists of several functional areas. For instance, R&D personnel, environmental engineers, and designers cooperate in examining the effects of their products on the environment and health before the designing stage [39]. A study by Huang and Li (2017) [23] demonstrates a significant positive correlation between a firm's coordination capability and GPT and GPI. The literature shows that transformational leaders are among the critical elements that can use the coordination capability necessary to promote innovation successfully [40].

Chen and Chang (2013) [10] stress that GTL is a leadership style that can integrate environmental management into product development and offers differentiated green product options to the public. GTL can promote GI by motivating its followers to acquire new knowledge [41]. Two recent studies show that GTL influences GI [4,42]. Although a recent study on high-technology firms in China reports the importance of GTL in promoting GPI and GPT [14], this research area is inadequate worldwide [42]. Therefore, this study analyzes the relationship of GPT and GPI capability as internal organizational propulsive power with managers' GTL style. Accordingly, we posit that:

Hypothesis 2 (H2a). *Managers' GTL positively impacts GPT.*

Hypothesis 2 (H2b). *Managers' GTL positively impacts GPI.*

2.3. CES, GPT, and GPI

How effectively firms use various resources for sustainable development depends on their CES [43]. It is more probable that firms applying CES redesign the present production process and adopt new pollution-reducing technologies to avoid adverse environmental effects [44]. When a firm is environmentally proactive, it can take strategic planning further, mobilizing every present resource for GI [25,45]. Consequently, the complex structure of GI necessitates improving and adopting it to use certain resources and green capabilities [46].

Surprisingly, Song and Yu (2018) [47] report an insignificant relationship between environmental strategy and GI performance, while Soewarno et al. (2019) [15] show that environmental strategy influences GI positively. However, our understanding of the impact of CES on GPI and GPT is still limited. These inconsistent findings necessitate further analysis. According to the NRBV, CES can ensure that the resources and capabilities needed to develop environmentally friendly products (GPT) and processes (GPI) are gathered with an innovative approach. Accordingly, we posit that:

Hypothesis 3 (H3a). *CES positively impacts GPT.*

Hypothesis 3 (H3b). *CES positively impacts GPI.*

2.4. GTL and FP

The transformational leadership approach underlies the central part of transformational leaders in enhancing performance at all organizational levels [48]. Although empirical studies have concentrated on testing the association of transformational leadership with follower performance at individual levels [49], the transformational leadership approach proposes various ways in which transformational leaders can influence their teams and organizational performance. Transformational leaders in the top management of firms can promote transformational leadership throughout the firm by serving as role models for leaders at lower levels [50]. They can enable lower management to perform better at the organizational level by increasing team unity, motivation, and goal unity [51]. Furthermore, they can affect FP positively with their effect on organizational climate, systems, and strategies [52]. Therefore, GTL can affect not only a firm's internal values and environmental performance but also its FP. The main goals of a firm realizing green implementations are to increase environmental performance and FP. Thus, the role of GTL is to enable the enterprise to reach its environmental and economic goals [53]. As far as we know, no study has considered the direct and indirect influence of GTL on FP. In a firm with an environment-oriented culture, environmental preservation is embedded in the daily routines of everyone, and each employee undertakes environmental responsibility actively, which encourages environmentally friendly behaviors by creating an atmosphere with full participation in environmental preservation. The mentioned type of environmental protection behavior helps form the firm's environmentally friendly image and increase its sales and market share [28,54]. The literature has indicated a positive correlation between an enterprise's proactive efforts to reduce adverse environmental effects and FP [55]. Therefore, it seems possible that the proactive efforts of managers with the GTL style affect FP positively. Accordingly, we posit that:

Hypothesis 4 (H4). *Managers' GTL positively impacts FP.*

2.5. CES and FP

There is no agreement in the literature on how CES affects FP [56,57]. This subject is one of the key unanswered questions in strategic management [58]. Studies have concentrated on the association of environmental issues with FP. A lot of research has revealed a positive

correlation between adopting environmental initiatives and FP [59–62]. Moreover, other studies have determined an insignificant and negative association [63–65].

According to the NRBV, firms with CES can increase FP by reducing energy consumption, using raw materials effectively, and producing high-standard products that can decrease costs and environmental burden [66]. In other words, this kind of firm can use their tangible and intangible resources effectively, which can cause decreased environmental burden and increased performance and competitive advantages [59]. Based on this, we posit that:

Hypothesis 5 (H5). *CES positively impacts FP.*

2.6. GPI and GPT

A study conducted in the manufacturing industry revealed a positive impact of GPI on GPT [23]. Another study argues that external stakeholder-oriented GPT is a precursor of internal stakeholder-oriented GPI [24].

GPI is considered to be positively related to GPT for various reasons. First, since GPI provides systematic improvements in all operational and managerial processes [26], it lays a foundation for GPT and thus can encourage green product design and manufacture. Second, process innovation can give enterprises a chance to enhance their product quality, expand their product variety or produce completely novel products, and therefore, increase their market shares [67,68]. According to Christmann (2000) [66], GPI, the main building block of GI, is a prerequisite for GPT [69]. Process innovation is required at all stages, including R&D, pilot production, and/or large-scale production stages [70]. Therefore, GPI may have a significant role in GPT. Based on this, we posit that:

Hypothesis 6 (H6). *GPI positively impacts GPT.*

2.7. GPT and FP

Some studies have indicated a positive association of GI with FP [71–73]. Other studies have revealed a negative and insignificant correlation [74,75]. Tariq, Badir, and Chonglertham (2019) [76] attempted to elucidate the incoherence in previous research concerning the association of GI with FP in this way. Most previous studies have not made a distinct separation between various GI types. Researchers have examined GPT or GPI or assessed GI in the general sense without describing GPT and GPI. Every innovation type can naturally obtain various performance results [27]. Thus, research on GI could not produce coherent findings, and the correlation between GI and FP remains a moot point. To deepen information and obtain detailed results, it is necessary to reflect particular GI types [77].

GPT is among the main factors enabling environmental sustainability and growth [78]. Investments in GPT can provide new opportunities to present novel market opportunities and obtain novel green product achievements. Additionally, GPT has critical significance in enhancing green competence, strengthening the green image, and improving FP [6,24,79]. Accordingly, we posit that:

Hypothesis 7 (H7a). *GPT positively impacts FP.*

2.8. GPI and FP

Firms can reduce their costs with GPI. Pollution is generally induced by resource waste, not completely used materials, or energy loss [80,81]. As claimed by Porter and van der Linde (1995) [82], pollution represents a kind of an economic waste because it is a sign of deficient, unprofitable, and inefficient usage of resources during production. A firm with poor process controls has unnecessary wastes, resource inadequacies, and defective and stored materials. The “Porter hypothesis” asserts that cost savings can be easily acquired with simple precautions. Studies have shown that GPI positively impacts firms’ competitive advantage and sustainability [5,6]. Xie et al. (2016) [83] concluded that end-of-pipe technologies and clean technologies, the primary elements of GPI, are

positively correlated with FP. Hence, firms can obtain a further competitive advantage with GPI, and a stronger GPI can increase FP [84]. Accordingly, we posit that:

Hypothesis 7 (H7b). *GPI positively impacts FP.*

2.9. Moderating Role of Differentiation Strategy

Although GPT can create value for firms, an appropriate strategy may be necessary for firms to catch this potential value [31]. According to the MBV, firms position their products differently to compete in the market [33]. In conformity with the implications of the literature about competitive strategy, it is expected that “differentiation strategy” shapes the way they benefit from/use the resources obtained from GPT [34].

Firms tending to differentiation strategy dedicate themselves to presenting distinctive products to their consumers [33]. Integrating the green concept into product design and packaging can increase product quality and bring together the advantage of product-related differentiation [85]. When a firm transmits its green image to consumers by successfully forming it with a differentiation strategy, consumers will more likely buy the product at a higher price [86]. The differentiation strategy is intended for customer loyalty and assists with breaking into novel market segments, expanding product portfolios, and obtaining higher premium benefits [87]. Thus, firms can obtain more economic benefits from GPT with a differentiation strategy. Chen and Liu (2019) [88] stress that a differentiation strategy governs the relationship of GPT with FP. Another study concluded that corporate green image moderates the correlation between GPT and FP [77].

On the other hand, GPI assists with reducing costs and increasing efficiency using refined and upgraded green technology [84]. However, the differentiation strategy directs the strategy of enterprises to product design instead of forming and maintaining lower costs and higher efficiency advantages [88]. Therefore, firms can obtain more profit and value from GPT by benefiting from the advantage of a differentiation strategy in product design and packaging. Accordingly, we posit that:

Hypothesis 8 (H8). *Differentiation strategy plays a moderator role in the relationship between GPT and FP.*

2.10. Mediation Relations

The top management affects an organizational result through strategy development and implementation [89]. As discussed in H1, H4, and H5, it is assumed that the GTL style is a key mechanism in improving FP and developing CES. Therefore, it is expected that FP will be positively affected by the effect of managers’ GTL on the improvement and implementation of CES [55]. Based on this, we posit that:

Hypothesis 9 (H9). *CES mediates the link between managers’ GTL and FP.*

Empirical studies [4,42] have supported the importance of the GTL style in enterprises’ increasing GI. According to Kim and Stepchenova (2018) [53], the main goals of GTL are to increase environmental and economic performance. However, research has revealed a positive and significant correlation between GI and FP [3,18]. Therefore, it is expected that managers’ GTL will lead the firm’s development of its GPI and GPT and thus, FP will increase. Based on this, we posit that:

Hypothesis 10 (H10a). *GPT mediates the link between managers’ GTL and FP.*

Hypothesis 10 (H10b). *GPI mediates the link between managers’ GTL and FP.*

Figure 1 shows the suggested conceptual model.

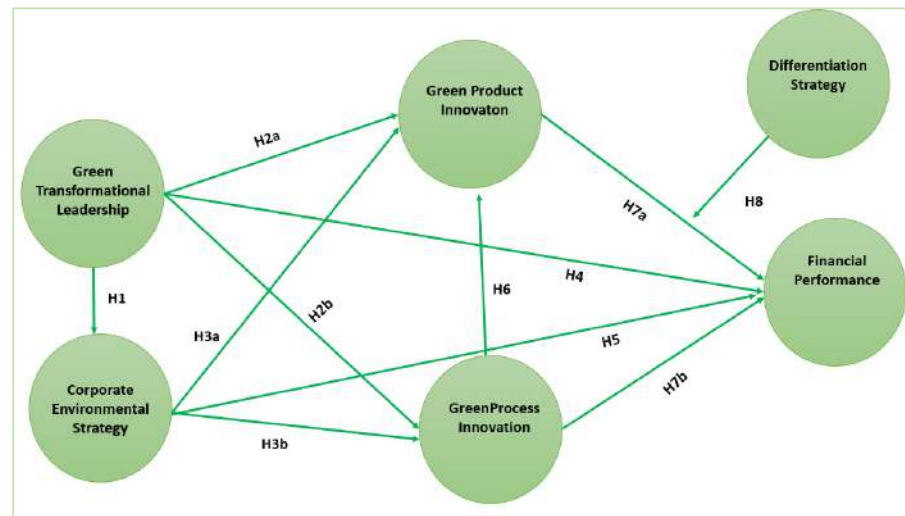


Figure 1. Suggested conceptual model.

3. Research Methodology

3.1. Sample and Data Collection

The hypothesized associations were tested by the primary data collected from a survey with firms having the ISO 14001 certificate in the First and Second 500 Industrial Enterprises List of Turkey in 2018. For data collection, these firms were contacted and provided with the necessary information about the research goal. E-mail addresses were obtained from the firms that accepted to participate in the survey, and the survey forms were sent to these addresses. To avoid the common method bias (CMB), the respondents of various constructs in the current research were not the same. The respondents of GTL, CES, GPT, and GPI were managers of the environment and sustainability departments. The respondents of differentiation strategy and FP were managers of the marketing and finance departments. In addition, Harman's single-factor test was used to analyze CMB in this study. When unrotated exploratory factor analysis is performed, the first factor explains 33.28% of the variance, which shows that the CMB is not an issue.

The entire data collection took four months, from July to November 2019. Three hundred fifteen firms with the ISO 14001 certificate responded. Considering the size of the sampled firms, most had between 251 and 2000 employees. Regarding the sector distribution of the firms that completed the survey, it was as follows: 41.3% in other sectors (multiple sectors), 12.7% in the automotive sector, 11.7% in energy, 9.2% in food, 7.6% in chemistry, 7% in the textile sector, 3.8% in white appliances, 3.5% in packaging, and 3.2% in the construction sector.

3.2. Measure of Constructs

The survey form prepared for the present study comprises two sections and 26 questions. All measurement items in the survey are listed in Appendix A. In the first section, the participants were asked about the departments they worked in, the size of their firm, and the sector. In the second section, questions about the variables to be studied were asked. All constructs in the current research were measured by employing a reflective indicator. To measure the GTL variable, 6-question instruments developed by Chen and Chang (2013) [10] were used. Then, the CES variable was measured using 5-question instruments developed by Banerjee (2002). Furthermore, GPT was measured with 4-question instruments developed by Chen, Lai, and Wen (2006) [5], while GPI was measured using the 4-question instruments again. To measure the differentiation strategy variable, 4-question instruments developed by Li and Li (2008) [90] were employed. Ultimately, FP was measured with 3-question instruments developed by Seggie, Kim, and Cavusgil (2006) [91]. All the items are measured by employing a seven-point Likert-type scale (1 indicates "strongly disagree" and 7 indicates "strongly agree").

4. Analysis and Results

4.1. Measurement Model Assessment

The present research used the SmartPLS 3 analysis program based on Partial Least Square Structural Equation Modeling (PLS-SEM) to test the suggested research model and hypotheses. The main reason for using the SmartPLS 3 data analysis program is that the research model is complex, associations between the variables can be tested simultaneously through it [92], and it does not have the assumption of normality since it is not parametric. In the SmartPLS 3 analysis program, first, the measurement model is confirmed, and then structural model relationships are computed. To evaluate the measurement model, it is necessary to analyze the confirmatory factor, reliability of constructs, convergent validity, and discriminant validity. Since all the variables employed were reflective, analysis was performed using the consistent PLS algorithm/PLSc step. The findings demonstrate that the measurement model fulfills all general requirements (see Table 1). First, the value of the factor loadings of indicators is >0.7 . Second, the value of Cronbach's alpha, composite reliability, and rho A of all the constructs is >0.7 . Third, all latent variables ensure convergent validity. Namely, the value of average variance extracted (AVE) is higher than the critical level of 0.50 [93].

Table 1. Measurement model results.

Latent Variable	Indicators	Factor Loadings	Cronbach's Alpha	rho_A	Composite Reliability	AVE
Green Transformational Leadership (GTL)	GTL1	0.871	0.950	0.951	0.960	0.802
	GTL2	0.908				
	GTL3	0.909				
	GTL4	0.904				
	GTL5	0.907				
	GTL6	0.872				
Differentiation Strategy (DS)	DS1	0.864	0.917	0.937	0.941	0.799
	DS2	0.893				
	DS3	0.895				
	DS4	0.922				
Corporate Environmental Strategy (CES)	CES1	0.791	0.864	0.867	0.902	0.648
	CES2	0.778				
	CES3	0.841				
	CES4	0.853				
	CES5	0.758				
Green Product Innovation (GPT)	GPT1	0.842	0.901	0.904	0.931	0.772
	GPT2	0.897				
	GPT3	0.886				
	GPT4	0.888				
Green Process Innovation (GPI)	GPI1	0.821	0.839	0.840	0.892	0.675
	GPI2	0.845				
	GPI3	0.813				
	GPI4	0.806				

Table 1. Cont.

Latent Variable	Indicators	Factor Loadings	Cronbach's Alpha	rho_A	Composite Reliability	AVE
Financial Performance (FP)	FP1	0.900	0.845	0.847	0.906	0.763
	FP2	0.858				
	FP3	0.863				
Moderating Effect 1 (DS-GPT)	DS1×GPT1	0.833	0.957	1.000	0.958	0.588
	DS1×GPT2	0.856				
	DS1×GPT3	0.699				
	DS1×GPT4	0.761				
	DS2×GPT1	0.849				
	DS2×GPT2	0.845				
	DS2×GPT3	0.717				
	DS2×GPT4	0.777				
	DS3×GPT1	0.815				
	DS3×GPT2	0.793				
	DS3×GPT3	0.660				
	DS3×GPT4	0.757				
	DS4×GPT1	0.799				
	DS4×GPT2	0.802				
	DS4×GPT3	0.649				
	DS4×GPT4	0.738				

Additionally, discriminant validity for all latent variables in the model was tested with the Fornell–Larcker criterion and heterotrait–monotrait ratio (HTMT). The square root value of AVE on the diagonal lines in Table 2 is higher than the correlations between the constructs in the model. Discriminant validity was also tested with the HTMT ratio, and as seen in Table 3, the HTMT ratio is below 0.85. According to these two results, it can be concluded that all variables in the current research model meet discriminant validity [93].

Table 2. Fornell–Larcker criterion ($n = 315$).

Latent Variable	Mean	S.D.	1	2	3	4	5	6	7
Differentiation Strategy	5.282	0.928	0.894						
Financial Performance	5.829	0.701	0.384	0.874					
Corporate Environmental Strategy	6.248	0.564	0.263	0.597	0.805				
Moderating Effect 1 (DS×GPT)	-	-	0.031	0.151	0.030	0.767			
Green Transformational Leadership	5.894	0.708	0.242	0.697	0.707	0.086	0.895		
Green Process Innovation	6.139	0.708	0.273	0.592	0.521	0.040	0.618	0.821	
Green Product Innovation	5.965	0.531	0.245	0.445	0.530	−0.087	0.517	0.452	0.879
SRMR = 0.061; NFI = 0.845; GoF = 0.671									

Note: Diagonal and italicized elements are the square roots of the AVE. The correlations between the construct values are below the diagonal elements.

Table 3. HTMT results ($n = 315$).

Latent Variable	HTMT						
	1	2	3	4	5	6	7
Differentiation Strategy							
Financial Performance	0.429						
Corporate Environmental Strategy	0.290	0.696					
Moderating	0.063	0.135	0.073				
Green Transformational Leadership	0.254	0.777	0.779	0.074			
Green Process Innovation	0.303	0.701	0.606	0.067	0.690		
Green Product Innovation	0.267	0.507	0.599	0.104	0.555	0.517	

Finally, a bootstrapping technique (5000 resamples) was used to form t-statistics allowing the statistical significance of the value of the factor loadings of indicators belonging to latent variables to be evaluated [93]. *t*-values show that the relationship of indicators with the latent variable they belong to is statistically significant (see Figure 2).

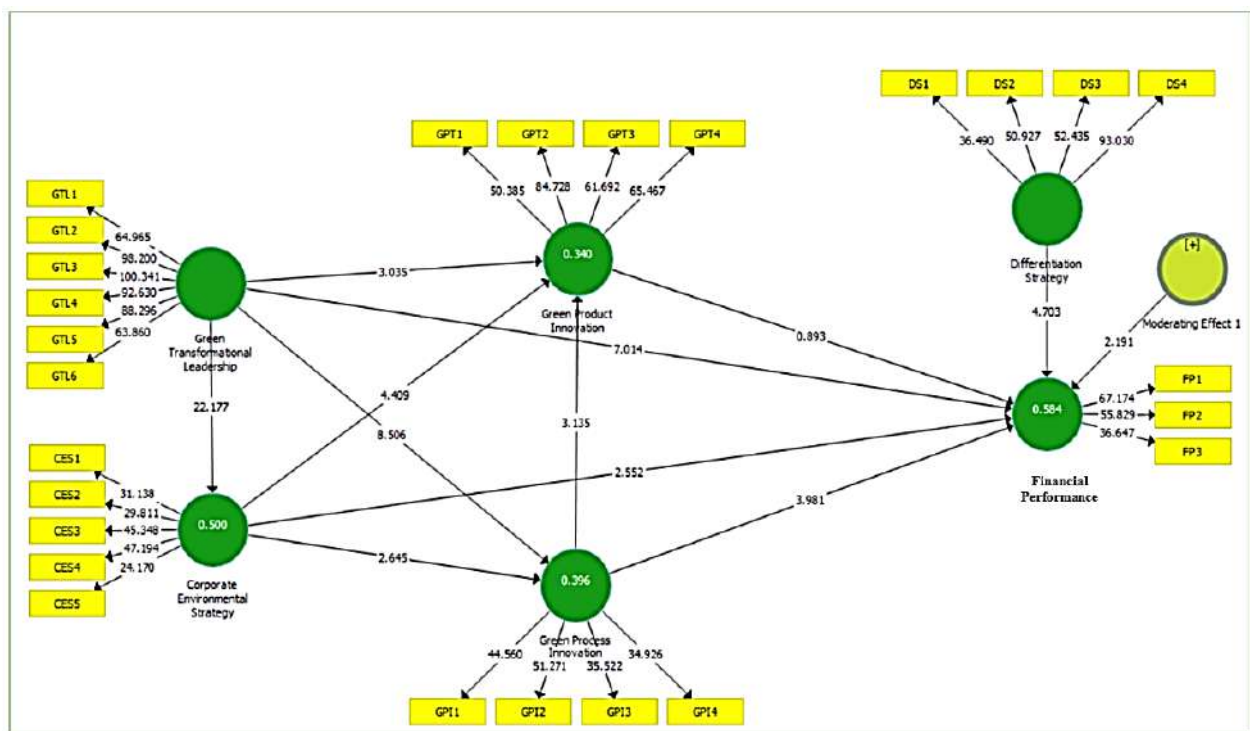


Figure 2. Assessment of the structural measurement model.

4.2. Structural Model Assessment

After confirming the reliability and validity of all latent variables in the measurement model, the variance inflation factor (VIF) value was evaluated to test the collinearity of the structural model. It can be stated that there is no collinearity problem among the latent variables because all VIF values are lower than the threshold value of 3. Then, upon evaluating R^2 values showing what percentage of the endogenous variables is explained, it is seen that CES, GPT, GPI, and FP are 0.500, 0.340, 0.396, and 0.584, respectively, and these values are considered good [94]. The effect size value (f^2) of every exogenous variable in the model changes between 0.02 and 1.00 in the category of small to large. The Q^2 predictive relevance value formed perfect endogenous variables, meaning that the model has a predictive relevance level. The value of goodness of fit produced via the standardized root mean squared

residual (SRMR) is equal to $0.061 < 0.080$, the normed fit index (NFI) is equal to $0.845 > 0.80$, and the goodness of fit (GoF) index is equal to $0.671 > 0.36$ (see Table 4), indicating that our model fits the empirical data.

Table 4. Hypothesis testing on the direct effect.

Structural Path	Coeff. (β)	S.D.	t-Values	p-Values	Adj. R ²	f ²	Q ²	VIF	Conclusion
GTL→CES	0.707 ***	0.032	22.177	0.000	0.500	1.001	0.322	1.000	H1 Supported
GTL→GPT	0.197 **	0.066	3.035	0.003		0.024		2.414	H2a Supported
CES→GPT	0.300 ***	0.069	4.409	0.000	0.340	0.067	0.255	2.047	H3a Supported
GPI→GPT	0.175 **	0.057	3.135	0.002		0.028		1.655	H6 Supported
GTL→GPI	0.500 ***	0.058	8.506	0.000		0.207		2.001	H2b Supported
CES→GPI	0.167 **	0.063	2.645	0.008	0.396	0.023	0.263	2.001	H3b Supported
GTL→FP	0.407 ***	0.057	7.014	0.000		0.158		2.504	H4 Supported
CES→FP	0.134 *	0.052	2.552	0.010		0.020		2.200	H5 Supported
GPT→FP	0.038	0.043	0.893	0.367		0.002		1.563	H7a Not Supported
GPI→FP	0.199 ***	0.050	3.981	0.000	0.584	0.055	0.435	1.730	H7b Supported
Moderating Effect (DS×GPT→FP)	0.100 *	0.046	2.191	0.028		0.024		1.033	H8 Supported

SRMR = 0.061; NFI = 0.845; GoF = 0.671

Note: Results of the bootstrapping with 5000 sub-samplings. *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$ (two-tailed).

Finally, a bootstrapping technique (5000 resamples) was employed to form t-statistics and standard deviation, allowing the statistical significance for hypothetical relationships in the research model to be evaluated. The path analysis results (see Table 4) revealed positively significant relationships between managers' GTL and CES ($\beta = 0.707$, $t = 22.177$, $p = 0.000$), GPI ($\beta = 0.500$, $t = 8.506$, $p = 0.000$), GPT ($\beta = 0.197$, $t = 3.035$, $p = 0.003$), and FP ($\beta = 0.407$, $t = 7.014$, $p = 0.000$), and in line with these results, hypotheses H1, H2a, H2b, and H4 were supported. Likewise, there were positively significant relationships between firms' CES and GPT ($\beta = 0.300$, $t = 4.409$, $p = 0.000$), GPI ($\beta = 0.167$, $t = 2.645$, $p = 0.008$) and FP ($\beta = 0.134$, $t = 2.552$, $p = 0.010$). In line with these results, hypotheses H3a, H3b, and H5 were supported.

The relationship between GPI and GPT was positively significant ($\beta = 0.175$, $t = 3.135$, $p = 0.002$). Again, a significant positive correlation was found between GPI and FP ($\beta = 0.199$, $t = 3.981$, $p = 0.000$). In line with these findings, H6 and H7b hypotheses were supported. Finally, hypothesis H7a was rejected because the association of GPT with FP ($\beta = 0.038$, $t = 0.893$, $p = 0.367$) was insignificant.

Data indicate the absence of a statistically significant correlation between GPT and FP, treated in isolation ($\beta = 0.038$, $t = 0.893$, $p = 0.367$). Furthermore, when GPT was supported or complemented with a "differentiation strategy" (GPT-differentiation strategy interaction effects), the initial lack of significance turned positive, as seen in Table 3. Namely, considering GPT and differentiation strategy jointly, the relationship with FP was significant and positive. Figure 3 shows the positive correlation and statistical significance of the moderating role of differentiation strategy in the association of GPT with FP ($\beta = 0.100$, $t = 2.191$, $p = 0.028$). Hence, H8 was supported.

The procedure of Zhao et al. (2010) [95] was implemented to analyze mediation effects in PLS-SEM. According to the findings, relationships between GTL → CES → FP ($\beta = 0.095$, $t = 2.543$, $p = 0.010$) and GTL → GPI → FP ($\beta = 0.100$, $t = 3.528$, $p = 0.000$) were positively significant. Then, the direct relationship between GTL and FP ($\beta = 0.407$, $t = 7.014$, $p = 0.000$) was assessed, and CES and GPI were observed to play a complementary partial mediator role (see Table 5). Accordingly, hypotheses H9 and H10b were supported. However, the GTL → GPT → FP ($\beta = 0.008$, $t = 0.844$, $p = 0.399$) relationship was statistically insignificant. Hence, hypothesis H10a was rejected.

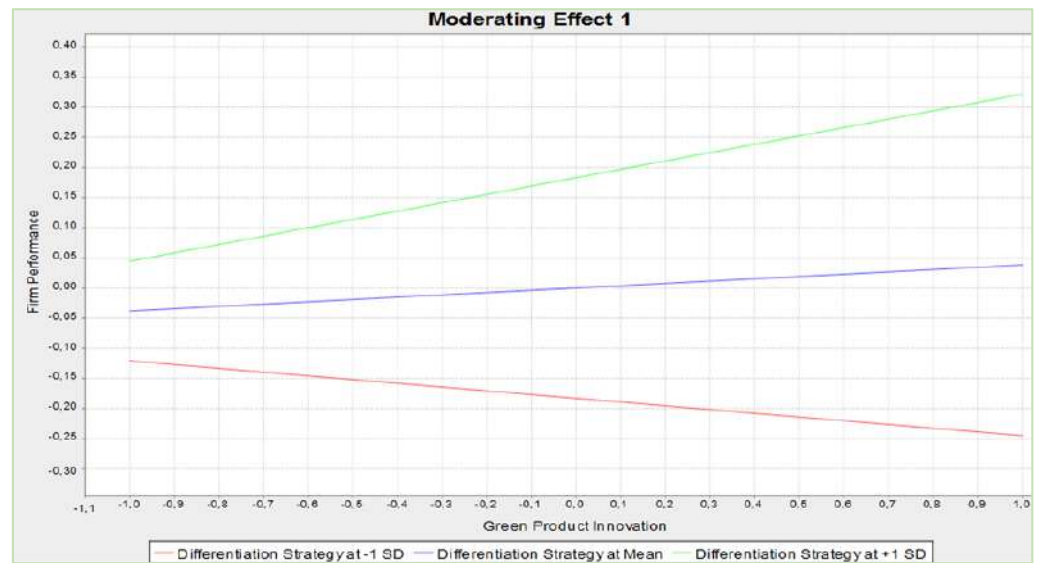


Figure 3. Moderating effect.

Table 5. Hypothesis testing on mediation.

Structural Path	Coeff. (β)	S.D.	t-Values	p-Values	Confidence Interval (BC) LL	UL	Conclusion
GTL→CES→FP	0.095 *	0.037	2.543	0.010	0.021	0.169	H9 Supported Complementary Partial Mediation
GTL→GPT→FP	0.008	0.009	0.844	0.399	−0.007	0.031	H10b Not Supported
GTL→FP	0.407 ***	0.057	7.014	0.000			
GTL→GPI→FP	0.100 ***	0.028	3.528	0.000	0.050	0.160	H10a Supported Complementary Partial Mediation

Note: *** $p < 0.001$; * $p < 0.05$ (two-tailed). Results of the bootstrapping with 5000 sub-samplings.

5. Discussion

Based on the NBRV and MBV, this study profoundly investigates the association of managers’ GTL with FP. Empirically, this study responds to the call to investigate GTL’s effect on GI and FP [96]. The direct influence of managers’ GTL on FP and the indirect effect under the joint action of CES, GPT, and GPI of managers’ GTL are examined. On the other hand, contradictory empirical findings in the literature imply that it is necessary to understand the connection between GPT and FP more extensively. From this perspective, the moderator role of differentiation strategy in the association of GPT with FP has been analyzed.

First, the results show that managers’ GTL improves the CES of firms in the manufacturing industry. While supporting a small number of recent studies [12,17,38], this finding contributes to the literature by considering the call of Huang et al. (2021) [17] to study the precursors of CES. Especially, top management’s GTL can shape and transform a firm’s values to ensure environmental protection. It can also enhance CES by understanding strategic priorities regarding environmental sustainability and influencing strategic choices [17].

Our study also determined that managers’ GTL influenced GPT and GPI positively. Evidence related to the role of GTL in promoting GPT and GPI is minimal. Therefore, our research supports a study from China, where leaders exercised power distance due to the teachings of Confucius’ hierarchy, but supported and directed employees to promote green practices in business ventures, strengthening the evidence for this relationship and expanding the theory [14].

Another result of our study is that CES improves GPT and GPI. When the literature was reviewed, it was clear that environmental strategy [15,47] and proactive envi-

ronmental strategy [97] are investigated as the precursors of GI practices. However, as Awan et al. (2021) [98] stated, research on the precursors of GI has not yet reached a consistent conclusion. We can explain these inconsistent results by referring to Banerjee (2002) [99]: “Having an official environmental policy does not indicate that this policy is actually implemented.”

Our study demonstrated that managers’ GTL strongly influenced FP. This result explains that managers’ GTL is an antecedent variable of FP. As far as we know, no studies have considered the direct and indirect influence of the GTL style on FP.

Another important result of our study is that CES positively influences FP. Although some researchers in the literature suggest an insignificant or negative relationship between CES and FP [63–65], studies supporting the results of our research are in the majority [60–62,100]. We attribute these inconsistencies to how CES is defined [56] and the incompatibility between strategy and organizational structure [101]. Consequently, firm management’s adopting a strategy focused on eco-efficiency to decrease energy and waste can reduce adverse effects on the environment and costs and thus increase FP.

Our study reveals the significance of GPI in improving GPT, and this result contributes to the literature by reinforcing the view that GPI is a prerequisite for GPT, despite inconsistent results on GPI and GPT causal sequences [24,69]. If the ultimate goal is to develop a green product, it may be a proper behavior for managers to prioritize GPI primarily.

Our study also indicates that GPI impacts FP, and this result is consistent with the limited research in the literature [5,84]. Despite the important role of GPI, researchers indicate the insufficiency of studies in the literature on GPI [78]. The current research contributes to the literature by heeding this call and examining GPI.

Finally, our research revealed no significant correlation between GPT and FP. This finding supports the researchers who indicated a negative and insignificant correlation between GPT and FP [74,75,102]. GPT necessitates firms to allocate significant resources and accompanies this with high uncertainty [103]. Firms generally have to bear significant costs while releasing a novel product that reduces environmental concerns in the market. These findings indicate that GPT has a negative and insignificant impact on FP due to its costly nature [104].

Considering GPT jointly with a differentiation strategy, its relationship with FP is statistically significant and positive. This finding strengthens the conclusions of a few researchers arguing that the relationship between GPT and FP is governed by the green image [77] and differentiation strategy [88].

Concerning the mediating relationships in the study, GPT does not play a mediation role in the association of GTL with FP. On the contrary, GPI and CES have complementary partial mediation roles in the relationship between GTL and FP. Relying on the results of our study, we argue that GTL is a strategic resource for shaping and implementing CES, which improves GI and FP.

5.1. Theoretical Implications

Our study contributes significantly to theory by discussing, through the NRBV, the strategic role of managers’ GTL in the Turkish manufacturing sector in using corporate capabilities and resources to promote CES, GPT, and GPI and improve FP. First, our study provides a perspective on how managers’ GTL affects GPT and GPI through CES to elucidate the structural relationship underlying the mechanisms within the firm by using the NRBV perspective. This study assumes and confirms that GTL and CES are inevitable antecedents for GPT and GPI as internal mechanisms. Additionally, CES functions as a connector between GTL and GPT, and GPI.

Top management’s GTL can especially shape and transform a firm’s values to ensure environmental protection. It can also enhance CES by understanding strategic priorities regarding environmental sustainability and influencing strategic choices [17]. GTL inspires and motivates subordinates by involving them in green actions and approaches to promote GI. It particularly answers the questions, “How do we achieve our green goals?” and “What are our outputs?” [105], and thus, subordinates take environmentally friendly

actions. Managers also guide their subordinates in creating and sharing green ideas and approaches by establishing close relationships and providing training to them to develop pro-environmental skills [106].

Second, we made a new contribution to the current literature by advancing the NRBV theory to elucidate the impact of managers' GTL on FP. In a firm with an environment-oriented culture, environmental protection is embedded in the daily routines of everyone, and each employee actively undertakes environmental responsibility. This promotes environmentally friendly behaviors by creating an atmosphere with full participation in environmental protection. This environmental protection behavior can assist with forming the firm's environmentally friendly image and increasing its sales and market share.

Third, our study assumes and confirms that GPI is an inevitable antecedent for GPT. If the ultimate goal is to develop a green product, it may be a proper behavior for managers to prioritize GPI primarily. Fourth, our study shows that according to the NRBV, GPI can increase FP by utilizing refined, upgraded green technology, thereby reducing costs, the unproductivity of a firm, and adverse effects of pollution [79].

Fifth, our research enriches the MBV theory by revealing the moderating effects of differentiation strategy on the link between GPT and FP. This research contributes to present studies on GPT in two important ways. First, the current research introduces a potential viewpoint to elucidate the present inconsistent research results about the connection between GPT and FP and thus enrich our understanding of reasonable ways to maximize the performance results of GPT. Second, many scientists have called to conduct more research to investigate the potential of GPT for value acquisition.

According to the RBV, competitive strategies can be designed in line with a firm's resources and capabilities and in a way that matches market conditions. The NRBV is criticized for not addressing the "black box" between sources and FP [102]. The current research contributes to the literature by combining this weakness of the NRBV with the MBV theory and considering the moderator role of differentiation strategy in the relationship between GPT and FP. As a result, the combination of the NRBV and MBV can increase FP by obtaining some advantages (customer loyalty, profitability, and market share) together with the positioning of green products in the market (with a differentiation strategy). Consequently, green products can create a higher input cost and potentially decrease a firm's profitability. Reflecting the green image on consumers by successfully forming it with the differentiation strategy can increase the possibility for consumers to buy the green product at a higher price [86].

Finally, we advance NRBV by showing that GPI and CES have complementary partial mediating roles in the relationship between GTL and FP. Our study presents a new contribution to the GTL literature by revealing the "black box" of the indirect effect of managers' GTL on FP.

5.2. Managerial Implications

The practical implications for managers and policy makers are as follows. First, this study shows that top managers' GTL style plays a key role in CES and is necessary to improve GPT and GPI. Second, this study uncovered that a firm needs top managers' GTL with professional capabilities to increase FP. Hence, managers should display the GTL style, set green-focused strategic priorities, present an inspiring green vision to their subordinates, and motivate subordinates to produce solutions for green manufacturing because doing so can yield better FP results. Furthermore, it is appropriate for managers in public institutions to display the GTL style so that they can set out the priorities of CES and promote GPT and GPI to achieve sustainable development goals. Third, our results suggest that GPI is an important determinant of GPT. Since GPI can promote GPT, firms should prioritize GPI. Therefore, managers should be aware of the importance of integrating GPI into their corporate goals. Fourth, this study demonstrates that CES and GPI are critical for minimizing greenhouse gases, coping with climate variability, reducing environmental damage, and improving FP. Thus, CES and GPI are inevitable for firms to enhance FP. Fifth,

it should also be noted that since GPT is not directly related to FP in terms of profitability, it is wrong to recommend that managers adopt GPT just to increase profitability. Managers should be sensitive about product differentiation if they want to benefit from GPT. In that case, firms must position themselves in niche markets to obtain profit from green products because, despite higher production costs, additional costs may be incurred on consumers who are likely to pay a higher price for environmentally friendly products [80].

5.3. Limitations and Future Studies

This study has some limitations. First of all, its scope is limited to Turkey. In the following studies, some national factors can be considered by evaluating the differences between Turkey and other countries. Additionally, other leadership styles and their effects in other industries can be examined, and thus, our conceptual model can be repeated, and it can be determined whether the relationships are the same. Moreover, this study uses cross-sectional data, although the data are reliable and represent the sample population. Therefore, researchers can utilize a longitudinal design to identify the temporary relationships. Finally, we researched CES as an important mediator in the relationship between GTL and GPT and GPI. However, different mediator variables can be examined on how and under what conditions the relationship between GTL, GPT, and GPI can be strengthened.

6. Conclusions

This study enables us to better understand how firms can fulfill their environmental responsibilities and improve their FP. Thus, it forms a framework for specifying how managers' GTL affects FP directly and indirectly under the joint action of CES, GPT, and GPI. Moreover, it addresses GPI as a precursor of GPT and evaluates the effect of GI (GPT and GPI) and CES on FP. On the other hand, our study analyzes the moderator role of the differentiation strategy in the relationship of GPT with FP based on contradictory empirical findings in the literature. The results primarily show that managers' GTL affects CES, GPI, GPT, and FP directly and significantly. Second, the partial mediation of CES and GPI in the relationship between GTL and FP was supported in our study, but the mediation of GPT was not supported. Third, our study demonstrates the importance of GPI in improving GPT. Fourth, no significant relationship was found between GPT and FP, but it was concluded that the relationship of GPT with FP was statistically significant and positive when considered together with the differentiation strategy. Our study provides managers with a framework to improve GI and FP by adopting the GTL style.

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Appendix A. Measurement Items

Green Transformational Leadership	
GTL1.	Our top management inspires the members of the organization with environmental plans.
GTL2.	Our top management provides a clear environmental vision for the members of the organization to follow.
GTL3.	Our top management makes the members of the organization work together for the same environmental goals.
GTL4.	Our top management encourages the members of the organization to achieve environmental goals.
GTL5.	Our top management acts by considering the environmental beliefs of the members of the organization.
GTL6.	Our top management stimulates the members of the organization to think about green ideas.
Corporate Environmental Strategy	
CES1.	Our firm has integrated environmental issues into our strategic planning process.
CES2.	In our firm, "quality" includes reducing our environmental impact.
CES3.	In our firm, we link environmental objectives with our other corporate goals.
CES4.	Our firm is engaged in developing products and processes that minimize environmental impact.
CES5.	Environmental issues are always considered when we develop new products.
Green Product Innovation	
GPT1.	Our firm selects the product materials causing the least amount of pollution to conduct a product development or design.
GPT2.	Our firm selects the product materials consuming the least amount of energy and resources to conduct product development or design.
GPT3.	Our firm uses the lowest amount of materials to comprise the product for product development or design.
GPT4.	Our firm would circumspectly deliberate whether the product is easy to recycle, reuse, and decompose for product development or design.
Green Process Innovation	
GPI1.	The manufacturing process of our firm effectively reduces the emission of hazardous substances or waste.
GPI2.	The manufacturing process of our firm recycles waste and emissions, which allows them to be treated and reused.
GPI3.	The manufacturing process of our firm reduces the consumption of water, electricity, coal, or oil.
GPI4.	The manufacturing process of our firm reduces the use of raw materials.
Differentiation Strategy	
DS1.	In comparison with competing products, our products offer superior benefits to customers.
DS2.	Our products are unique, and nobody but our company can offer them.
DS3.	We make great efforts to build a strong brand name, and nobody can easily cope with this.
DS4.	We successfully differentiate ourselves from others through effective advertising and promotion campaigns.
Firm Performance	
FP1.	Our firm performs much better than our competitors in profitability.
FP2.	Our firm performs much better than our competitors in ROI.
FP3.	Our firm performs much better than our competitors in cash flow from operations.

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