

# **The Quest for Sustainability- Green Transformational Leadership towards Green Performance: A Time-Lagged Study- Symmetric and Asymmetric Analysis**

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## **Abstract**

**Purpose** – Drawing upon the natural resource-based view the present study explores the role of green dynamic capability (GDC) as a mediating variable in the relationship between green transformational leadership (GTL) and green innovation (GI) in the hotel industry. The research further assesses the green performance (GP) as a resultant factor of GI.

**Methodology** – The research was conducted in Italian luxury hotels to assess the efficacy of our conceptual framework among workers in the hospitality industry. The study utilized a three-wave, two-week time-lagged design (N = 303). In addition, the study also intends to apply PLS-SEM and fuzzy qualitative comparative analysis (fsQCA) to have distinctive discernment into model rapport.

**Results** – The results of the study indicate the linkage between green transformational leadership and green innovation. Furthermore, the study also found the partial mediation of green dynamic capability. The results show numerous combinations using fsQCA that can be utilized to increase green performance.

**Originality** – There is little empirical evidence to study GTL and GI in hospitality studies. This work empirically investigates GTL, GDC, and GI relationships to fill a knowledge gap. It also explains undiscovered factors and provides causal recipes to improve green performance using fsQCA.

**Keywords:** Green Transformational Leadership; Green Dynamic Capability; Green Innovation; Green Performance; Natural Resource-Based View

## **1. INTRODUCTION**

Contemporary organizations are currently grappling with unprecedented challenges as a result of the United Nations' 2030 Agenda and its seventeen Sustainable Development Goals (Janjua et al., 2024). This requires them to modify their strategies and operations to meet the criteria of the SDGs. The tourism industry particularly the hotel segment is highly susceptible to the upcoming challenges posed by climate change (Janjua et al., 2024). The growing concerns about the environment have driven the hotel and tourism industry to embrace environmental management practices to maintain their competitiveness in the global market. Numerous academicians have examined the transition from a linear to a circular economy and

the concept of sustainability. There are still numerous concerns that pertain to the execution and improvement of optimal practices (Janjua et al., 2024; Lagioia et al., 2024). A recent study emphasizes the need to examine the adoption of sustainable practices in the hospitality industry and how they affect the overall performance of luxury hospitality (Jain et al., 2023).

The global significance of incorporating environmental sustainability measures such as eco innovation and green innovation (GI) as a fundamental business value has grown in recent years. Eco innovation as opposed to green innovation, does not have a specific focus on addressing environmental challenges. Instead, it advances environmental sustainability as an entire concept (Kusa et al., 2023). The former seeks to satisfy the environmental obligations of regulatory bodies or the ecological concerns of potential consumers and stakeholders (Singh et al., 2020). However, existing research indicates that enhancing GI strategy is crucial for achieving economic success, minimizing ecological harm and attaining sustainable development goals (Janjua et al., 2024). Scholars have proposed that hotel organizations ought to devise and execute ecologically sustainable innovations as a means of reducing their carbon footprint and mitigating potential environmental hazards (Janjua et al., 2024). Research claims that studies on environmentally friendly innovations are still in their infancy and lack any substantial accomplishments (Arici et al., 2023).

In today's dynamic business environment, the ability to shape the future trajectory of organizations relies heavily on the presence of effective leadership. Transformational leadership has gained substantial momentum and influence over conventional perspectives of management setting it apart from other leadership styles (Aslam & Sahibzada, 2024; Janjua et al., 2024; Singh & Chaudhary, 2023). Green transformational leadership (GTL) signifies providing inspiration and motivation to enable the organization to achieve its environmental objectives (Chen & Chang, 2013). GTL leader inspires and engages their subordinates in endeavours that contribute to the environmental management of the organization. These activities encompass promoting sustainable development, addressing environmental challenges, and enhancing the environmental performance of the organization as its entirety. The significance of GTL concerning GI has been acknowledged in the services sector (Begum et al., 2022). Prior studies conducted in high-tech and manufacturing industries indicate that GTL plays a substantial role in ameliorating the adverse environmental impacts stemming from industrial pollution (Begum et al., 2022; Cui et al., 2023). However, the current body of scholarly research has not yet established the underlying factors that are responsible for the correlation between GTL and GI (Begum et al., 2022), particularly within the context of the

hospitality industry (Janjua et al., 2024). Therefore, further investigation has been suggested to fully comprehend the association between GTL and GI (Begum et al., 2022).

Furthermore, it is contended that the impact of GTL on GI within the hospitality industry is intricate and ever-changing, as there exist numerous mediating factors that may either augment or reduce the correlation. Thus, we utilize the natural resource-based view (NRBV) (Hart, 1995) to comprehend the correlation between GTL and GI. The framework establishes a connection between a firm's resources and capabilities and the natural environment (Begum et al., 2022). we contend that these resources and capabilities encompass the green dynamic capability (GDC) of luxury hotels. Scholars assert that GI as an outcome is contingent on organizational dynamic capability (Yuan & Cao, 2022) and green environmental orientation (Janjua et al., 2024). Based on the gap and ambiguity in the prevailing academic works, we, therefore, presented a theoretical model that illustrates how hotels harness organizational green dynamic capability (GDC) to expedite green innovation for achieving green performance. Thus, we recommend that GTL, as a strong organizational resource may enhance the GDC of organizations to obtain GI. Although, prior research has investigated the intermediary role of GDC in the connections between CSR-GI link within the manufacturing industry (Yuan & Cao, 2022), as well as the connection between stakeholder pressure and GI within the SME sector (Singh et al., 2022). However, no study has explored how the GDC of organization mediates between the GTL and GI. Therefore, researchers have increasingly become interested in uncovering the mediating processes that explain how GTL affect GI in the hotel industry (Begum et al., 2022; Cui et al., 2023).

In the existing scientific literature, there is scarce practical research focusing on innovation and ecological concerns (Janjua et al., 2024). Particularly, the interrelationships between GI and green performance (GP) have received limited attention within the hospitality industry. Investigations on GI and GP have also produced contradictory findings (Awan et al., 2023). On the one hand, enabling services businesses to employ GI techniques can result in the implementation of such strategies, notwithstanding the possibility that such strategies will not boost profits (Zhang et al., 2023). On the other hand, ignoring the possibility that they will not increase profits (Yu et al., 2023). Recent research has shown, however, that such interconnection may generate appalling performance because of augmented growth of time stretch and expenses involved (Yu et al., 2023). These contradictory findings have piqued the curiosity of scholars about the links between GI and GP in the services industries (Awan et al.,

2023). Therefore, the current study fills the gap by analysing the relationship using the NRBV framework and determines if GI can provide GP for luxury hotels.

Finally, this study makes a valuable contribution to the existing body of knowledge by addressing the substantial gaps that have been highlighted in the preceding discussion. This study highlights the intricate interplay of GDC between GTL and GI to understand the contributing role of GTL on GI and GP. This approach considers the unique environmental challenges encountered in the hospitality industry while maintaining an analytical perspective that is distinct from the manufacturing sector. Furthermore, prior research has predominantly focused on the positive effects and outcomes of green innovation. There are a limited number of studies that have emphasized the potential of the green innovation model achieved through the execution and implementation of GTL which might significantly improve organizational green performance. Moreover, the study offers methodological contributions by utilizing a configuration approach and assesses the combination of conditions that could improve a hotel's green performance. The concept of this research is novel in assessing various causal configurations to enhance hotel green performance (Kallmuenzer et al., 2021; Kusa et al., 2022; Suder, 2023). Therefore, the present study contributes by seeking factors explaining causal recipes to build a higher GP base through GTL, GDC, and GI. This work also provides a noteworthy contribution to the field of organizational behaviour, GI and leadership through the utilization of an asymmetries approach and a time-lagged research methodology to perform a thorough investigation of the presented model.

## **2. HYPOTHESES DEVELOPMENT AND THEORITICAL SUPPORT**

### **2.1. Theoretical support**

The natural resource-based view (NRBV) (Hart, 1995) is crucial to strategic management because it allows product and process innovation to overcome environmental restrictions. Sustainable development, product stewardship, and pollution prevention are three interdependent strategies that can be employed to achieve this objective. First, a sustainable development strategy prioritizes the development of products and processes that have minimal environmental impact (Begum et al., 2022). Second, the product stewardship strategy aims to minimize the environmental impacts of products throughout their entire life cycle. This includes assessing the environmental effects at various stages such as sourcing raw materials, product manufacturing, operation, and the disposal of used products. Third, the goal of the pollution prevention strategy is to mitigate waste and decrease emissions and contaminations

in business operations (Begum et al., 2022). These strategies serve as the fundamental basis for green innovation aimed at preserving the natural environment and promoting the use of energy in ecologically sustainable ways (Janjua et al., 2024).

Drawing on insights from the NRBV, our research suggests the existence of a relationship between GTL and the development of green innovation. Our study highlights the importance of using GTL as a valuable resource and emphasizes how NRBV can enable hotel managers to find innovative solutions to reduce waste, lower emissions, and tackle contamination problems in their operations. Our study also posits that these resources and capabilities enhance the organizational green dynamic capability (GDC) of luxury hotels. The current research posits that the GTL facilitated by GDC contributes to the advancement of GI which can result in better GP of the service industry (Begum et al., 2022).

## **2.2.Green Transformational Leadership and Green Innovation**

In the sustainability context, there has been a surge in popularity for sustainable leadership and green transformational leadership styles in recent literature. Both green transformational leadership and sustainable leadership are dedicated to environmental responsibility. However, sustainable leadership takes a more comprehensive approach by considering environmental, social, and economic sustainability in decision-making and actions while green transformational leadership (GTL) emphasizes driving environmental change through transformative leadership (Chen et al., 2023).

GTL is leadership behavior that inspires and motivates followers to operate at levels of environmental performance that exceed expectations (Chen & Chang, 2013). Previous investigations indicate that GTL significantly influences innovation within organizations (Begum et al., 2022). GTL leaders cultivate the mental and emotional fortitude necessary to develop, share, and implement green initiatives. More importantly, these leaders place a high priority on fostering a green climate and inspire staff to respond to shifting market conditions by obtaining market knowledge (Begum et al., 2022).

Several factors have been identified as precursors to green innovation in the past literature including green intellectual capital in large manufacturing organizations (Cui et al., 2023), green-absorptive capability in the electric power industry (Pacheco et al., 2018) and external information-sharing in manufacturing organizations (Zhang et al., 2020) and GTL in the high tech industry (Begum et al., 2022). As a result, this analysis presents researchers with a unique

opportunity to examine the previously unexplored impact of GTL on GI in the Italian hospitality sector. It was also mentioned by Gürlek and Koseoglu (2021) that GI studies are relatively new to the hospitality and tourism literature. As a result, attempts to integrate and analyze existing research on GTL-GI are severely limited (Janjua et al., 2024). Based on the above discussion we propose the following:

**H1:** Green transformational leadership impacts on green innovation.

### **2.3. Green Transformational Leadership, Green Dynamic Capability and Green Innovation**

Green dynamic capability (GDC) is used to describe an organization's propensity to recognize favorable and unfavorable conditions in its external environment, pursue tailored procedures and assets to respond to fluctuating market conditions and influence its surroundings via integrating green knowledge and cooperation (Teece, 2007). A substantial body of evidence suggests that organizations can improve their environmental performance through green innovation and the production of less hazardous products and processes if they achieve a certain level of GDC (Yuan & Cao, 2022). This argument raises the crucial issue of how these GDCs are cultivated particularly in the hospitality industry. Previous research has demonstrated that the function of top leaders' style is crucial for the development of the dynamic capability of organizations (Ahmad et al., 2022). However, with a pro-environment perspective green transformational leaders possess the ability to construct and revitalize GDC that are essential for the advancement of environmentalism.

It has been discovered that leadership is a crucial factor in developing the GDC required to promote GI in the SME sector (Ahmad et al., 2022) and the textile and apparel industry (Nabi et al., 2023). However, little research has been done on the connection between GTL and GDC in the Italian hospitality industry. To address this contextual gap, it is deemed valuable to acquire a more comprehensive understanding of how GTL can enhance GDC within the hospitality industry (Chen & Chang, 2013). This association can also be considered plausible based on the theoretical proposition of NRBV which posits that the utilization of organizational resources (GTL) and essential competencies (GDC) is crucial (Sarkis et al., 2010) for eco-environmentalism.

**H2:** Green transformational leadership impacts green dynamic capabilities.

Green dynamic capability (GDC) is seen as a prerequisite for GI as shown by the research of (Ahmad et al., 2022). Prior studies (Yuan & Cao, 2022) and (Singh et al., 2022) have shown

that GDC guarantees GI in a variety of industries that are linked to products or processes including the advancement in contributing to massive amounts of trash remanufacturing, enterprise environmental conservation, energy-saving, pro-environmental design, and pollution prevention. Hence, GDC has a favorable effect on GI because of their ability to detect, collect, and predict market demand for green products, shifts in green technology, and policies about the adoption of GI (Ahmad et al., 2022). GDC will only be distinguishable and generate a lasting competitive advantage if firms effectively transform them into green innovation (Ahmad et al., 2022). Prior research has revealed that the dynamic capabilities of businesses contribute to the effective utilization of energy and fuel resources. Consequently, this facilitates the integration of green innovation within small and medium-sized enterprises (Singh et al., 2022). Nevertheless, there is a dearth of research investigating the relationship between GDC and GI within the context of the Italian hospitality industry.

**H2a:** Green dynamic capability impacts on green innovation.

Furthermore, it has been well recognized that green transformational leadership has a significant role in influencing green innovation. Despite this, there is a continued requirement for the development of empirical evidence of a mediation linkage between GTL and GI (Begum et al., 2022). Previous studies have surveyed to investigate the role of green thinking and creative process engagement as important mediators in the association between GTL and GI (Begum et al., 2022). This information serves as a foundation for exploring potential indirect effects beyond the suggested direct impact of GTL on GDC and GDC on GI. Hence, we propose:

**H2b:** Green dynamic capability mediates between the GTL and green innovation.

#### **2.4. Green innovation and green performance**

The concept of green innovation is intricately connected to the sustainability goals of organizations as it serves to promote and enhance green performance (Singh et al., 2020). Green performance (GP) initiatives aim to meet and exceed societal expectations concerning the natural environment (Awan et al., 2023) in a way that goes beyond mere compliance with regulations (Gu, 2022). Organizational behavior studies have shown that greater ecological performance can reduce waste and redesign products/processes to reduce the environmental effect (Awan et al., 2023). As a result of lower costs and less waste, GI also has the potential to generate social as well as ecological and financial benefits (Gu, 2022). Furthermore, green innovation helps organizations achieve environmental protection criteria, lowering the danger of sanctions from government regulators and protecting them from public criticism (Janjua et al., 2024).

According to Asadi et al. (2020), firms that dedicate substantial resources to green innovation (GI) activities are likely to exhibit higher levels of green performance. Singh et al. (2020) also argue that there is a connection between GI and GP in the SME sector. However, the impact of GI on green performance is still largely unknown (Singh et al., 2020), particularly in the hospitality industry. we argue that the GP of a hotel will be higher when its management and employees actively participate in environmentally sustainable practices demonstrating a higher degree of commitment and cognitive effort. Therefore, we propose:

**H3:** Green innovation impacts on green performance.



## 1 **2.5. Configurational Modelling**

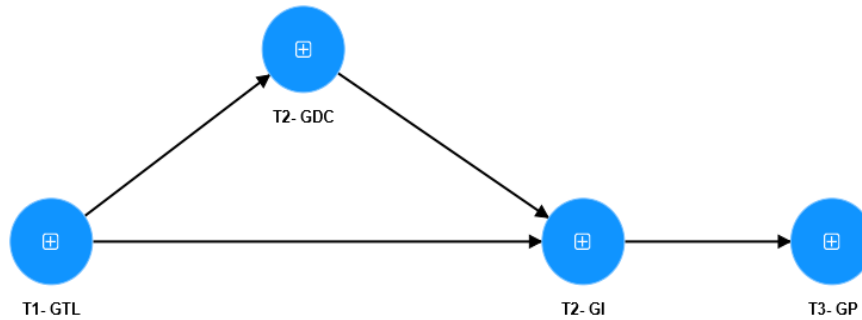
2 The existing study applies fsQCA to illustrate incongruent underlying configurations that  
3 may improve GP by combining GTL, GDC and GI. Symmetric approaches measure the direct  
4 link between GTL and GI, GTL influence on GDC, GDC effect on GI and GI influence on GP.  
5 fsQCA configures result conditions. fsQCA estimates are more precise than the lineal addition  
6 method (Alam, Zhang, Shehzad, et al., 2023; Farooq Sahibzada et al., 2021; Kallmuenzer et  
7 al., 2021; Suder, 2023). The application of fsQCA has a strong reputation for hospitality  
8 research (Kallmuenzer et al., 2021; Kusa et al., 2022; Rasoolimanesh et al., 2022; Suder, 2023)  
9 as this unties the course that shows key circumstances for latent findings (Aslam & Sahibzada,  
10 2024).

11 A contemplation of the complex nature of the determinant's stirring GP is tempting as the  
12 hospitality sector comprises innumerable integrated mechanisms. Different combinations of  
13 variables like GTL, GDC and GI can subsequently intensify a hotel's performance. fsQCA can  
14 assess if GTL, GDC, and GI are agreeable, disagreeable, or inconsequential to the hotel's green  
15 performance. The consideration of GTL and GDC is of utmost importance as they each play a  
16 specific role within the organization (hotels). By combining these two (symmetric and  
17 asymmetric) elements, management can effectively identify a configuration that will lead to  
18 the desired outcome (GI). The outcomes obtained from fsQCA will facilitate the identification  
19 of a distinct pattern of equifinality, which refers to the existence of multiple pathways and  
20 solutions that result in the same outcome (Kallmuenzer et al., 2019; Kusa et al., 2022;  
21 Sahibzada et al., 2022; Sahibzada et al., 2020; Suder, 2023). Specifically, this analysis reveals  
22 that numerous combinations of GTL, GDC, and GI have the potential to lead to higher GP. The  
23 hypothesized associations indicate an order of causality resulting from GTL, GDC and GI  
24 leading to GP. Prior research indicates that the implementation of GTL practices can lead to  
25 an increase in GDC among manufacturing small and medium enterprises (SMEs), as  
26 demonstrated by (Ahmad et al., 2022). Additionally, GDC has been found to contribute to the  
27 enhancement of GI within the textile and apparel industry (Nabi et al., 2023). Henceforth, there  
28 are multiple methods to achieve a high GP by utilizing a combination of GTL, GDC, and GI.

29 fsQCA evaluates precursor state dependency instead of double and triple exchange part  
30 numbers. Combining GTL, GDC, GI and GP may assist the company in restructuring its goals.  
31 fsQCA findings reveal an equifinality trend (Farooq Sahibzada et al., 2021; Kallmuenzer et  
32 al., 2021; Suder, 2023) wherein several combinations of GTL, GDC and GI can direct to  
33 advanced GP. Increasing calls have been made to use fsQCA to uncover complex underlying

1 recipes (Farooq Sahibzada et al., 2021). The originality of the existing study is in explaining  
2 combinative intricacy considering unequal interactions rather than symmetrical effects. (See  
3 Figure 1)

4 **H4:** Diverse recipes of GTL, GDC and GI are associated with the hotel's green performance.



5  
6 **Figure 1:** Conceptual Framework (Source Authors)

### 7 **3. RESEARCH METHODOLOGY**

#### 8 **3.1. Data Collection Technique**

9 The time-lagged research design was utilized to conduct an empirical test of the  
10 conceptual model. The sample for the study consisted of managers and employees from the  
11 hospitality industry in Italy. The study analyzed a mediated model which was examined using  
12 three-wave time-lagged data, with a two-week interval between each wave. At T1, we  
13 conducted measurements on GTL, while at T2, we assessed GDC and GI. Finally, at T3, we  
14 evaluated GP.

#### 15 **3.2. Population, Sample and Data Collection**

16 A time-lagged research design was utilized to investigate our mediated model  
17 empirically. The conceptual model was tested using data obtained from hospitality workers  
18 situated in Italy. Data was collected using the online platform Prolific which is known for its  
19 focus on subject recruitment for researchers, high recruitment standards, and user-friendly  
20 interface (Janjua et al., 2024). The present study was executed in three distinct phases, with a  
21 time interval of two weeks separating each phase. Prior research in the domain of leadership  
22 has suggested a two-week break among successive rounds of data gathering (Aslam &  
23 Sahibzada, 2024). At time point 1 (T1), data was gathered from a sample of 347 participants  
24 concerning their supervisor's GTL approach. At the second time point (T2), the 347 participants  
25 were requested to furnish information about their GDC and GI. At T2, data was collected from  
26 321 participants who were requested to provide their ratings on GDC and GI. Two weeks after

1 the T2 wave, the same 321 participants were asked to rate GP again. At T3, a total of 321  
 2 participants were involved in the study. Following the identification of multivariate outliers, 18  
 3 responses were eliminated, leaving 303 valid responses for subsequent analyses.

4 The Prolific IDs of the respondents were employed as exclusive codes to correspond  
 5 and integrate the data they had furnished in the three waves. Out of the total sample size of  
 6 303 participants, 62.4% were males and 37.6% of them identified as female. Additionally, it  
 7 was found that 35.6% of the sample population fell within the age range of 30 to 39 years,  
 8 while 24.8% were between the ages of 20 and 29 years. Furthermore, 48.2% of the participants  
 9 held a master’s degree, while 40.9% possessed between 11 to 15 years of work experience in  
 10 the hospitality sector. (Please see Table 1 for instrumentation).

11 **Table 1: Instrumentation and Operational Definitions**

Variables	No of Items	Sources
Green Transformational Leadership	06	(Chen & Chang, 2013)
Green Dynamic Capabilities	07	(Chen & Chang, 2013)
Green Innovation	08	(Chen et al., 2006)
Green Performance	09	(Yu et al., 2017)

12 **Source:** Author (s)

13 **3.3. Method of Analysis**

14 The data was first analyzed via SPSS for demographic information of the respondents  
 15 and then the PLS-SEM method was employed using Smart PLS (Ringle et al., 2018). This  
 16 technique has become popular and vigorously used in business, management, and HR research  
 17 specifically in the hospitality sector (Janjua et al., 2024). This method of estimation is suitable  
 18 for this study for various reasons. First, PLS-SEM is an appropriate choice where the objective  
 19 of the study is prediction. It has a high predictive capacity in terms of exploratory research and  
 20 development of new or extending existing theories (Sarstedt et al., 2022). Second, the current  
 21 research model operationalizes a composite scale for the constructs having complex modelling  
 22 including a mediator (Janjua et al., 2024). As our model has no second-order formative  
 23 multidimensional constructs (See Table 1) therefore PLS-SEM is deemed an appropriate choice  
 24 here. Moreover, PLS-SEM is appropriate and robust in investigating small sample sizes and  
 25 complex models (Sarstedt et al., 2022).

26 **3.4. Symmetric And Asymmetric Modelling**

27 The current investigation utilizes a combination of direct and configurational analysis  
 28 methodologies. Low and high explanatory variables correlate with low and high outcome

1 variables in direct association presumptions. These values are required for low/high outcome  
2 variable satisfaction (Woodside, 2013). High values of the explanatory variable are generally  
3 acceptable, according to the configurational linkage, but they are not needed for high values of  
4 the observed variable. Multiple underlying circumstances may generate the same values. For  
5 instance, if the explanatory variable has low values, the result variable may inflate with high  
6 values (Woodside, 2013).

7 For symmetric analysis, PLS-SEM 4.0 was used. PLS-SEM is designated a well-  
8 proportioned examination that measures the overall admissible impact of the descriptive  
9 variable on projected model results. PLS-SEM is a symmetrical analysis that analyses the  
10 minor net effect of the independent variables on the model outcome. PLS-SEM can investigate  
11 multi-layered route patterns, which SEM cannot do (Ringle, 2005). PLS-SEM requires a  
12 consistent sound measurement scale. Originally, the measuring scale must be authenticated for  
13 consistency and soundness to perform PLS-SEM. Next to it, SEM investigation ought to be  
14 utilized to scrutinize the proposed relations.

15 Afterwards, the fsQCA approach computes underlying recipes for explaining multi-  
16 layered settings (i.e., a mix of explanatory variables leading to the exact outcome) (Kusa et al.,  
17 2022; Olya et al., 2018; Suder, 2023). H4 is interpreted using fsQCA. fsQCA helps determine  
18 other causal recipes leading to comparable results. In management literature, the distinctive  
19 approach analyses how several factors produce important and passable contexts surrounding  
20 intrinsic results (Kallmuenzer et al., 2021; Kallmuenzer et al., 2019; Rihoux & Ragin, 2008).

21 PLS-SEM and fsQCA were utilized to understand scale structures. The integration of PLS-  
22 SEM and fsQCA methodologies ensures a comprehensive comprehension of the interconnected  
23 structure of the scales (Aslam & Sahibzada, 2024). fsQCA inquiry enhances PLS-SEM  
24 outcomes by calculating GTL, GDC and GI for escalating GP. The fsQCA methodology is a  
25 novel approach utilized in the management sector to identify dissimilar interactions (Farooq  
26 Sahibzada et al., 2021).

## 27 **4. Results**

### 28 **4.1. Common Method Bias (CMB) and Multi-Collinearity**

29 The present study employed a Harman one-factor test to examine CMB. The data were  
30 collected from various sources and periods (T1, T2, and T3) and were anonymized. The study  
31 revealed that items characterized by a single factor exhibited a total variance of less than 35.6%,  
32 which fell below the established threshold of 50% as proposed (Harman, 1976). Thus, there

1 was no cause for concern regarding common method bias. we examined the data for  
 2 multicollinearity and determined that variance inflation factor (VIF) values were less than 5 as  
 3 discussed in recent studies e.g., (Janjua et al., 2024). Thus, our data revealed no  
 4 multicollinearity issues between the constructs.

#### 5 **4.2. Testing Measurement Model**

6 The study examined the research model and evaluated its internal consistency by  
 7 utilizing Cronbach's alpha and composite reliability (CR) metrics. Additionally, the study  
 8 evaluated the model's convergent and discriminant validity by analyzing outer loadings,  
 9 average variance extracted (AVE), and Fornell-Larcker, as outlined by (Hair et al., 2017).  
 10 Cronbach's alpha and CR must exceed 0.6 to validate the study internal consistency (Nunnally,  
 11 1967). Table 2 shows internal consistency. All AVE ratings were over 0.5 to evaluate  
 12 convergent validity (Hair et al., 2017). All values for the construct were found to be greater  
 13 than 0.6, therefore the study retained all the items.

14 The study validated convergent and discriminant validity (Hair et al., 2017).  
 15 Discriminant validity is the extent to which constructs differ from each other. To assess  
 16 discriminant validity, various techniques were used, i.e., cross-loading and Fornell and Larcker  
 17 criterion. However, the lack of validity and low sensitivity of these methods motivated to  
 18 development of new criteria named Heterotrait-Monotrait (HTMT) (Henseler et al., 2015).  
 19 HTMT confirms discriminant validity when two constructs correlate less than 0.90. In this  
 20 study, researchers assessed discriminant validity through HTMT and found a correlation less  
 21 than the standard value of 0.90 among all studied constructs (Henseler et al., 2015). (See table  
 22 2 & 3).

23 **Table 2:** Item Loadings, Reliability, and Convergent Validity

	$\Lambda$	$\alpha$	CR	AVE
Green Transformational Leadership		0.911	0.912	0.693
GTL1	0.812			
GTL2	0.832			
GTL3	0.861			
GTL4	0.828			
GTL5	0.850			
GTL6	0.810			
Green Dynamic Capability		0.933	0.933	0.714
GDC1	0.822			
GDC2	0.855			
GDC3	0.832			

GDC4	0.873			
GDC5	0.852			
GDC6	0.847			
GDC7	0.833			
Green Innovation		0.937	0.939	0.696
GI1	0.857			
GI2	0.883			
GI3	0.823			
GI4	0.860			
GI5	0.834			
GI6	0.765			
GI7	0.809			
GI8	0.837			
Green Performance		0.949	0.950	0.711
GP1	0.782			
GP2	0.874			
GP3	0.854			
GP4	0.847			
GP5	0.861			
GP6	0.870			
GP7	0.821			
GP8	0.840			
GP9	0.838			

1 **Source:** Author (s)

2

3 **Table 3:** Discriminant Validity (HTMT)

	T1- GTL	T2- GDC	T2- GI
T2- GDC	0.652		
T2- GI	0.646	0.780	
T3- GP	0.408	0.771	0.810

4 **Source:** Author (s)

5

### 6 **4.3. Structural Model Evaluation**

7 The process of examining the structural model involved a methodical analysis of all  
8 proposed hypotheses sequentially. First, an examination was conducted on the impact of T1-  
9 GTL on T2- GI which was followed by T2- GDC, impact on T2- GI. Additionally, the  
10 investigation also assessed the influence of T2- GI on T3- GP. To determine the applicability  
11 of direct pathways and estimated average errors, 5,000 bootstrap resamples were employed  
12 (Ringle, 2005).

1 T1- GTL has a significant impact on T2- GI, as shown in Table 4 ( $\beta = 0.381$ ,  $t = 5.567$ ,  
 2  $p < 0.000$ ). H1 is supported.

3 In addition, it can be observed that T1- GTL has a significant impact on T2- GDC ( $\beta =$   
 4  $0.899$ ,  $t = 47.92$ ,  $p < 0.000$ ) and T2- GDC impact on T2- GI ( $\beta = 0.566$ ,  $t = 8.638$ ,  $p < 0.000$ ).  
 5 Thus, hypotheses H2a and H2b are substantiated.

6 Lastly, the impact of T2-GI on T2-GP ( $\beta = 0.893$ ,  $t = 45.593$ ,  $p < 0.000$ ) was confirmed.  
 7 As a result, H3 is supported. (See Table 4).

8 **Table 4:** Structural Equation Model

Hypotheses	Relationships	Sample Mean	Standard Deviation	T statistics	P values	Decision
H1	T1 - GTL -> T2 - GI	0.381	0.069	5.567	0.000	Accepted
H2	T1 - GTL -> T2 - GDC	0.899	0.019	47.926	0.000	Accepted
H2a	T2 - GDC -> T2 - GI	0.566	0.065	8.638	0.000	Accepted
H3	T2 - GI -> T3 - GP	0.893	0.020	45.593	0.000	Accepted

9 Note: a significant direct effect at 0.05 (one-tailed test)

10 **Source:** Author (s)

11 **4.4. Mediation Analysis**

12 A mediation analysis was conducted. The proposed model has one potential indirect  
 13 effect involved in the analysis. We selected the more critical mediation effect for parsimony  
 14 and to provide the simplest explanation (Henseler et al., 2015). The assessment of T2-GDC is  
 15 conducted to determine whether they mediate the correlation between T1-GTL and T2-GI as  
 16 indicated by H2b. The results indicate that the inclusion of the mediator in the model resulted  
 17 in a significant and positive direct effect ( $\beta=0.381$ ,  $t= 5.567$ ,  $p<.001$ ). Significant indirect effects  
 18 were observed for T2-GDC ( $\beta=0.508$ ,  $t=8.810$ ,  $p<.001$ ). Therefore, the findings indicate that  
 19 there is partial mediation. This indicates that the influence of T1- GTL on T2- GI is partially  
 20 passed via T2- GDC. Therefore, H2b is accepted. (See table 5).

21 **Table 5:** Mediation Outcomes

Total effect (T1- GTL-> T2 - GI)		Direct effect (T1- GTL-> T2 - GI)		Indirect Effects of T1- GTL on T2- GI			
Coefficient	P-value	Coefficient	P-value	Coefficient	SD	T value	P Values
0.89	0.000	0.381	.000	0.508	0.058	8.810	0.000

22 **Source:** Author (s)

## 4.5. Findings Of the Configurational Model

### a. Calibration

Data calibration is the process of encoding variables to values in the range of 0 to 1. For calibration, we used the “calibration” command in fsQCA 4.0, which is based on the log function (Ragin, 2008). In this procedure, we used the percentiles 0.95, 0.5 and 0.05 as the cut-off thresholds (Fiss, 2011).

- Full participation rate: 95th percentile
- Full non-participation rate: 5th percentile, and
- Cross-over point: fiftieth percentile

### b. Necessary Conditions

The fsQCA is assumed to construct the equifinality of GP. It complements SEM by allowing complex responses to develop (Woodside, 2013). The fsQCA method constructs conditions that are a consequence of its procedure. Configurations are result variables like predictor variables. fsQCA technique differs from symmetric ones since it allows formations/configurations to fragment, removing blocks from conditions to support the partial effect (Kallmuenzer et al., 2019; Kusa et al., 2022; Suder, 2023). SEM discovered that GTL, GDC and GI have a positive link with GP, whereas fsQCA explores numerous circumstances in which they operate as a condition and join as a configurational component, resulting in greater GP in the hotel business (Kallmuenzer et al., 2021; Kallmuenzer et al., 2019).

The fsQCA starts by calibrating data into fuzzy sets and separating in-out-, and between-set circumstances. The 95th percentile for full participation, the 5th percentile for full non-participation, and the fiftieth percentile as a cross-over point were defined.

After the calibration is done, the conditions are checked. Table 6 shows the condition analysis. None of the requirements meet  $> 0.9$  consistency. Hence none are obligatory. It also displays that a sole criterion cannot explain GP.

**Table 6:** Necessity conditions

	Consistency	Coverage
GTLC	0.669566 *	0.674851
~GTLC	0.598648	0.521576
GDCC	0.658754 *	0.673460
~GDCC	0.677458 *	0.680546
GIC	0.740189 *	0.793078



~GIC	0.571354	0.693249
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1 **Note:** ~ shows that a condition does not exist. For the most part, it meets the 0.65 consistency  
2 benchmark.

3 **Source:** Author (s)

4 **c. Solution**

5 This research explores Boolean algorithm transitional solutions to better understand  
6 passable situations that impact predicted results. fsQCA analyses appropriate conditions using  
7 truth tables with causal conditions and consistency levels. Table 7 demonstrates GP's  
8 provisional solution. Patterns suggested show the condition, whereas blank space indicates “do  
9 not care”.

10 The result of fsQCA indicates four sufficient conditions (four solutions) that led to high  
11 green performance (see Table 7) in the examined luxury hotels. Combinations of GTL, GDC,  
12 and GI a sufficient condition for a high outcome. This validated the results of the SEM analysis.  
13 Research suggests three paths/ solutions to enhance hotel GP. The first path/configuration  
14 includes GTL, which may enhance GP. The second configuration combines GDC and GI to  
15 increase GP. The third setup is GTL, GDC and GI, which may produce higher-quality GP. This  
16 is a vibrant equifinality symbol (Fiss, 2011). Concerning the coverage values, the fsQCA  
17 exposes an inclusive solution coverage score of 0.707 which means that the three structures of  
18 causal conditions “explain” 70.7% of GP subsidizing within the recommended limit of 0.25–0.90  
19 (Ragin, 2008). Thus, in these solutions, the role of GTL, GDC and GI in shaping GP becomes  
20 relevant. Table 7 shows the results of the combinations that forecast high GP.

21

22 **Table 7:** Intermediate solution

Conditions	Outcome: Green Performance		
	1	2	3
Green Transformational Leadership	•	∅	•
Green Dynamic Capability		•	•
Green Innovation	∅	•	•
Raw Coverage	0.496189	0.434160	0.510168
Unique Coverage	0.044175	0.041734	0.040125
Consistency	0.894018	0.850146	0.810146
Solution Coverage	0.707		

Note: ● states the existence of a condition, Ø omits a condition, and a blank area indicates 'do not care'.

Source: Author (s)

## 5. DISCUSSION, CONCLUSION AND IMPLICATIONS

### 5.1. Discussion

According to NRBV, GTL executives can boost GP by developing their GDC and GI skills. GTL may motivate employees to promote GI by including them in sustainable activities and strategies (Ahmad et al., 2022). When an organization's environmentally friendly goals are clearly communicated, employees are more likely to act sustainably (Begum et al., 2022). GTL prioritizes organizational goals and subordinate needs. It trains them to develop and promote green ideas that reduce the hotel's carbon emissions. Second, GTL and GDC are positively correlated, supporting the NRBV theory (Hart, 1995). This theory indicates how companies like hotels might use GDC to efficiently manage natural resources and promote GI. This shows that GTL, a hotel's crucial resource, might improve luxury hotel GDC. GTL hotels are more likely to boost GDC. In a more complex setting, hotels aiming to improve their GDC must possess GTL leadership. Thirdly, partial mediation was identified in our inquiry. The primary objective of this study is to fill a void in the current body of literature on the field of hospitality. This was achieved by investigating a previously undiscovered association using asymmetric and longitudinal methods.

Prior studies have investigated the role of mediators such as green thinking and green process engagement (Begum et al., 2022), as well as organizational green learning (Cui et al., 2023) in the rapport among GTL and radical green innovation. In addition, the role of green dynamic capability as a mediator between CSR and GI (Yuan & Cao, 2022) as well as between stakeholder pressure and GI (Singh et al., 2022) has been analyzed in recent studies. The findings of the study confirm the substantial impact of GTL on GI, GTL on GDC, and GDC on GI leading to a notable enhancement in GI. Thus, demonstrates partial mediation. GTL fosters a culture of environmental consciousness within the organization thereby promoting the development of GI behavior (Begum et al., 2022). The results indicate that GTL has a significant impact on GDC and GI. The findings are in line with prior studies conducted outside of the hospitality industry (Ahmad et al., 2022; Begum et al., 2022). GTL has the potential to exert a direct impact on GI, as well as an indirect positive impact through GDC. The results

1 also suggest that hotels must enhance their GDC to elevate their GI under the patronage of  
2 GTL. The implementation of GI in hotel establishments is contingent upon their robust GDC  
3 in comparison to their rivals. This involves the ability to perceive, capture, and convert  
4 opportunities, which in turn enables them to effectively manage their resources and aid in GI  
5 (Yuan & Cao, 2022). The improved capacity of organizations to acquire, implement, and  
6 enhance their comprehension of GI contributes to the enhancement of GP in the hotel industry.  
7 Finally, the results revealed three causal equations (configurations) that could aid in achieving  
8 increased GP. In addition to Solution 1, which exclusively demonstrates that the integration of  
9 GTL results in enhanced GP, there exist numerous combinations of GTL, GDC, and GI that  
10 have the potential to yield a higher GP. The results indicate that both GTL and GI contribute to  
11 high GP, demonstrating a distinct pattern of equifinality. In 51% of cases, the combination of  
12 GTL, GDC and GI is sufficient for a high GP, as shown in Table 7 third solution. Therefore,  
13 not only is GTL pursuing a high GP, but if GI exists, hotels will ultimately demonstrate a higher  
14 GP as well. The results supported the hypothesis that there are multiple routes to improved GP,  
15 emphasizing the need for additional use of fsQCA in management literature (Alam, Zhang,  
16 Khan, et al., 2023; Farooq Sahibzada et al., 2021; Kallmuenzer et al., 2021; Kusa et al., 2022;  
17 Suder, 2023). The findings offer a comprehensive framework for management that facilitates  
18 the identification of strategies that can effectively contribute to enhanced outcomes (Olya et  
19 al., 2018).

## 20 **5.2. Theoretical Implications**

21 First, the present study elucidates that GTL facilitates organizational GI and offers  
22 novel perspectives on how the hospitality industry can enhance extant practices to foster GI,  
23 thereby yielding GP. This study validates prior research and explores a single alternative  
24 pathway GDC that links GTL and organizational GI in the hospitality industry. Second,  
25 the study demonstrates that GTL serves as a notable precursor to GI, which serves as an  
26 enhanced manifestation of GI conduct. As a result, we add to the body of work that has mostly  
27 focused on validating the relationship between transformative leadership and organizational  
28 innovation (Rafique et al., 2022). Even when academics have examined the variables that affect  
29 GTL and GI, they have only measured innovation from the employee perspective (Begum et  
30 al., 2022). Third, the study highlights the influence of GTL on GI which is accentuated by the  
31 mediating effects of GDC. GTL and GDC must work together to ensure positive organizational  
32 behavioral change such as green innovation, that benefits the entire community. In addition, it  
33 contributes to the GP of hotels. In the context of GTL, previous research has demonstrated that

1 leaders may significantly impact behavioral effects such as employee commitment, green  
2 creativity, and innovation (Begum et al., 2022; Bhutto et al., 2021; Singh et al., 2020). Finally,  
3 our study contributed to the extant literature by extending NRBV theory (Hart, 1995) to better  
4 understand and explicate the determinants that influence GTL, GDC, GI, CA and GP.

### 5 **5.3. Practical implications**

6 Global decarbonization requires sustainable business practices in every sector, including  
7 luxury hotels. The study emphasizes the significance of luxury hospitality workers in  
8 recognizing, collecting, and predicting market demand for green products. It also emphasizes  
9 the need to be abreast of green legislation and green initiative implementation. GTL has the  
10 potential to facilitate substantial advancements in green innovation and outcomes across the  
11 processes and products of the hospitality industry (Chen et al., 2023). This study presents some  
12 significant findings that affect managerial practice and society.  
13

14 First, the findings indicate that GTL has a significant impact on GI. Our findings firmly  
15 support the execution of GTL among hotel employees to foster GI in the Italian hospitality  
16 industry. The findings suggest that GTL leaders and managers hold a positive view of  
17 employees' capabilities in addressing sustainability concerns and highly appreciate their  
18 contributions, resulting in a boost in GI. These leaders serve as a source of motivation within  
19 the organization, fostering a culture of innovation and continuously seeking new opportunities  
20 for green innovation. Therefore, we suggest that hotels seeking ethical business practices must  
21 prioritize GTL behavior (Farooq et al., 2022). Second, GDC serves as a bridging mechanism,  
22 helpful in attaining GI and green performance toward a sustainable organization framework.  
23 Hotels must improve their GDC to attain GI. In the operational context of a hotel or service  
24 sector, managers must recognize the significant impact of GDC. This awareness enables them  
25 to effectively manage and guide the strategic direction of green innovation practices rather than  
26 solely reacting to external pressures such as meeting environmental regulations or addressing  
27 environmental concerns in services industries. Therefore, we recommend that organizations  
28 should contemplate allocating additional resources towards environmental management  
29 initiatives to improve their ecological footprint thereby securing a more favourable standing  
30 with all stakeholders. The service sector (hotels) should categorically value the increased  
31 environmental awareness among clients as it allows them to readily switch to alternative  
32 options. The increasing demand for GI is placing pressure on organizations to adopt

1 environmentally friendly practices across all aspects of their operations, including processes,  
2 products, and services (Cui et al., 2023). Finally, GI can play a pivotal role through  
3 management interventions in facilitating and advancing sustainable development initiatives  
4 within the hotel industry. The role of GI in mitigating the environmental impact of a hotel's  
5 operational activities including re-designing and enhancing products or services to meet new  
6 environmental criteria. By enhancing resource efficiency and leveraging technology, GI not  
7 only contributes to reducing the hotel's carbon footprint but also enhances its brand reputation.  
8 Additionally, GI implementation leads to cost savings and ensures compliance with regulatory  
9 standards. By promoting sustainable practices luxury hotels can contribute to long-term  
10 competitive advantage, mitigate their environmental impact, and achieve green performance.  
11 Moreover, the concept of sustainability is a crucial aspect of luxury hospitality. Hospitality  
12 leaders should incorporate this component into their business model to ensure it becomes an  
13 integral part of their strategy development. They need to prioritize the promotion of  
14 environmentally friendly practices within the organization and effectively communicate these  
15 values to external stakeholders as a strategy to achieve the overarching goal of sustainability.

#### 16 **5.4.Conclusion**

17 The study examined whether GTL directly and indirectly supports GI in hospitality  
18 through GDC. We further investigated how GI affects GP in Italian luxury hotels. The study  
19 employs NRBV (Hart, 1995) to explain the relationship between GTL-GDC-GI and GP. The  
20 findings indicate a significant correlation between GTL-GI and GTL- GDC. The NRBV (Hart,  
21 1995) theoretical framework supports the study's results that GTL may significantly affect an  
22 organization's GDC and GI.Ultimately contributing to the achievement of organizational GP.

#### 23 **5.5.Limitations and future directions**

24 First, a detailed mediation model was employed to study the GTL-GI connection  
25 utilizing time-lagged research. Experimental design may change research results. Second, the  
26 current study showed that GTL affects hotel green innovation through GDC. Additionally,  
27 Green innovation also affects luxury hotel green performance. Further research is necessary to  
28 explore additional factors that may impact green innovation and green performance within the  
29 same industry. Third, the present study examined the green transformational leadership style,  
30 future research may examine empowering leadership, servant leadership, green inclusive  
31 leadership, inspirational leadership, and creative leadership. Finally, online research platforms  
32 compromise random sampling. Registered users on such networks tend to highlight their

1 accomplishments, which may skew their comments. Alternative data collection methods  
2 should be prioritized in future study.

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## Appendix

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### Green Transformational Leadership

1. The leader inspires subordinates with the hotel's environmental plan.
2. The leader of the hotel provides subordinates with a clear environmental vision.
3. The leader of the hotel encourages subordinates to work on environmental plans.
4. The leader of the hotel encourages employees to attain environmental goals.
5. The leader of the hotel considers the environmental beliefs of subordinates.
6. The leader of the hotel stimulates subordinates to think & share their green ideas.

### Green Dynamic Capability

1. Our hotel has the ability that fast monitor the environment to identify new green opportunities.
2. Our hotel has effective routines to identify and develop new green knowledge.
3. Our hotel has the ability to develop green technology.
4. Our hotel has the ability to assimilate, learn, generate, combine, share, transform, and apply new green knowledge.
5. Our hotel has the ability to successfully integrate and manage specialized green knowledge within the company.
6. Our hotel has the ability to successfully coordinate employees to develop green technology.
7. Our hotel has the ability to successfully allocate resources to develop green innovation.

### Green Innovation

1. Our hotel has selected environmentally friendly raw materials in product development
2. Our hotel has used energy-efficient raw materials in product development
3. Our hotel has carried out the efficiency of raw materials for the production process in product development
4. Our hotel has evaluated that the product is easy to reuse, recycle, and decompose
5. Our hotel has effectively reduced the emission of hazardous substances or waste in the production process
6. Our hotel has effectively recycled waste and emissions in the production process
7. Our hotel has effectively reduced the consumption of water, electricity, or oil in the production process
8. Our hotel has effectively made innovations to reduce the use of raw materials in the production process

### Green Performance

1. Our hotel conforms with the requirements of inputs of energy
2. Our hotel conforms with the requirements of community relations.
3. Our hotel conforms with the requirements of outputs of air emissions
4. Our hotel conforms with the requirements of indicators on the local, regional or national condition of the environment.
5. Our hotel conforms with the requirements of outputs of wastewater.
6. Our hotel conforms with expectations of implementation of environmental policies and programs
7. Our hotel has achieved important environment-related certifications.
8. Our hotel has regularly achieved targets for energy conservation, recycling or waste reductions.
9. On average, the overall environmental performance of our hotel has improved over the past five years.

9  
10  
11

**Source:** Author (s)

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