

Article

Transformational Leadership Drives Sustainable Behavior

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Abstract

This research paper examines the relations between transformational leadership and sustainable behavior at both individual and organizational levels, regarding employees in Jordanian hotels. The study examines the relationships between transformational leadership practices and both employee environmental behavior and organizational sustainable behavior. A quantitative method was applied to test the relationships among the research variables; 338 valued questionnaires were used in the analysis process and to present the results. This research shows that transformational leadership has a positive influence on the employees' motivation to act sustainably, increases their awareness of sustainability issues and enables the employees to take a proactive role in sustainable activities. The findings of this study indicate that transformational leadership supports fostering sustainable behaviors in the workplace via three major mechanisms: motivation to act sustainably, empowerment to act, and awareness of sustainability issues. Ensuring the application of transformational leadership in an organization influences the individual and organizational sustainability practices in the long run in the form of vision articulation, encourages innovation, and increases the focus on employees' needs. The study explains the effect of sustainable behavior through major mechanisms, including motivation to act sustainably, awareness of sustainability issues, and employee proactivity, across the range of employees and the organization, offering new insights to the hospitality sector regarding long-term sustainability leadership.

Keywords: transformational leadership; sustainable behavior; empowerment; awareness; motivation



Academic Editors: Hye Hyun Yoon and Hyo Sun Jung

Received: 13 May 2026

Revised: 12 June 2026

Accepted: 22 June 2026

Published: 8 July 2026

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1. Introduction

The effects of climate change contribute to increased environmental challenges in the hospitality industry and call for a need to reshape organizational priorities, in addition to leadership outlook and capabilities [1]. Factors such as climate change, which leads to biodiversity loss and resource scarcity, have created an urgent need for hotel decision makers to integrate sustainability into organizational processes, policies and strategies [2]. The urgent need coincides with rising customers' expectations, firmer regulatory frameworks, and the need to concentrate on sustainable operations, prioritizing environmental actions to impact brand credibility and ensure success and sustainability in the hospitality sector. Yet, despite these increasing challenges, the hotel sector still struggles to scale its environmental goals among its organizations. This gap puts forward leadership as the main focus of the current study, as the most critical factor of organizational change.

Therefore, leaders in the hospitality sector who adopt sustainability transformation have grown reputations and received more attention in scholarly research as to several managerial practices. Given the growing frequency and complexity of sustainability issues, traditional leadership practices and approaches in command and control are considered insufficient [3]. To face these challenges, major changes in employees' attitudes are required, in addition to changes in the organizational culture and the hotels' operations, including service delivery, customer relationships, and facility manager actions [4]. Accordingly, sustainability transformation in the hospitality sector requires innovative leadership approaches that are able to provide a stronger environmental vision, develop green actions, and support change, in addition to fostering commitment to climate goals and actions at all organizational levels [5]. However, the literature does not provide an adequate explanation of what kind of leadership processes are most likely to stimulate this change and what the dynamics are between these management processes and the front-line staff at the hotels, which is an important area that has not been tested empirically.

A literature review on the hospitality sector shows that explaining the relation between transformational leadership (TL) and sustainable behavior (SB) needs a more complex explanation and describes a process that requires cognitive, motivational, and behavioral actions and mechanisms; it includes motivation to act sustainably (MAS) [6]. TL influences SB by developing employees' awareness of sustainability issues (ASI), and motivating environmentally friendly actions, in addition to increasing sustainable engagement activities and initiatives [7]. These mechanisms operate concurrently through multiple organizational levels, resulting in cascading effects that are responsible for shaping individual behavior and stimulating green actions and innovation in the hospitality sector [8]. With this recognition, studies of ASI and MAS have mostly been conducted separately; none of these studies has conducted an empirical test of their simultaneous mediation in the hotel-specific context. This is a major theoretical gap because the impact of motivational readiness on cognitive awareness and the resulting actions may explain why sustainability projects fail to take off or stall out [6].

It is critical to understand the role of TL in driving and directing sustainability in the hospitality sector [5]. Hotels that prioritize adopting environmental aspects in order to improve performance must implement systematic approaches to leadership development that are responsible for promoting SB changes [9]. Noting that many sustainable actions and practices are voluntary, which requires a long-term strategy and commitments, transactional leadership approaches may lead neither to sustainable engagement nor the targeted innovative actions for a meaningful sustainability transformation in the hospitality sector [10]. However, there is no known model that clearly explains how TL engages in the psychological and motivational process, for example with respect to ASIs and MAS, that leads to sustained as opposed to episodic behaviors. If there is no such model, leadership development initiatives and hotel sustainability actions will be based on guesses [5].

It is of the utmost priority to adopt environmental issues; otherwise, it may result in dramatic operations and social risks, noting as well that TL is the key factor in activating sustainability in the hospitality sector. Hotels are pressured to prove their actions towards environmental contribution and their involvement in sustainable development goals. There is an urgent need to lead an inquiry into how different leadership styles can be used effectively to adopt SB, and support businesses' future success in addition to social prosperity. To directly address these gaps, this research suggests and empirically tests a mediation model that links TL to SB through two intervening psychological constructs: (ASI) and MAS of employees. This model addresses three gaps: to start with, the joint mediating role of ASI and MAS has not been tested for the two together; second, the TL, SB cascade across organizational levels in hotels has never been tested empirically; finally,

MAS has not been validated as a mediator specifically in the hotel sector [9]. The results of this paper will impact hospitality leadership educational programs in the future, and reform the transformation programs in the hospitality sector; it will optimize the strategic plans and interventions, which will result in stronger sustainable hospitality initiatives and practices.

Although there has been increasing interest in corporate sustainability, the current research linking TL to sustainable behavior is limited by important geographical, theoretical and practical gaps. Domination models are prevalent and overwhelmingly apply to a Western, developed economy, and their relevance in the Middle Eastern culture with its high power–distance and the collectivistic nature of the hospitality industry has not been tested [11]. To date, research on change has been significantly based on isolated, single-mediator pathways, without simultaneously comparing the effects of different parallel pathways that could be the main drivers of sustainable change. In practical terms, the existing literature fails to address key operational challenges in the Jordanian hotel sector, such as the fact that the sector suffers from serious environmental problems with regard to its resource use, while the organizational leadership is also characterized by significant traditionalism, centralism and lack of employee autonomy at the front line. This study directly addresses these gaps by creating a competitive parallel mediation mechanism in this unique, centralized market environment, both as an empirical boundary test of leadership theory, and as a strategic roadmap for local hotel operators in their efforts to encourage discretionary green innovation.

2. Theoretical Foundations

2.1. TL Theory

TL works on employees by creating awareness about valuable knowledge, values, and outcomes and inspiring employees to place the group's interest and benefits above their personal interests. It has four elements, including idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration, which confer effective requirements of sustainable leadership [8].

Idealization leads to sustainability in behavior and commitment to the environment, whereas intellectual stimulation leads to innovation, which goes against the traditional way of doing business. Inspirational motivation helps in the development of sustainability visions by the leaders that are in line with organizational environmental goals. The individualized consideration promotes employee growth through increased knowledge and capabilities in terms of sustainable development [12,13].

The extension of TL principles to the environmental issues reduces environmental worries and offers sustainability values for actions related to the environment [12].

2.2. TL Leads to SB

Empirical studies highlight that employee MAS and employees' behavior are influenced by TL in the hospitality sector [14,15]. The evidence also shows that sustainable TL is a key to motivate employees to commit to sustainable initiatives and actions in the workplace and enhance environmental performance in the hospitality sector [16,17]. Research shows that TL inspires and motivates employees' engagement in environmental activities and positive organizational behavior; therefore, TL is worth investigation and adoption to ensure having an organization that supports and sustains environmental plans and actions [18]. This relation is crucial in the hotel industry, as TL encourages innovative employees' behavior that affects the organizational sustainability across all divisions and departments [16].

However, regarding the TL components, rather than operating as a vague, monolithic construct, TL drives sustainable behaviors by matching specific behavioral dimensions to corresponding cognitive, attitudinal, and structural mediators within the organization. Thus, by changing hotel routines, intellectual stimulation challenges employees to tackle waste in the business. Through encouraging staff to think outside the box about how to deal with a lack of resources in their areas, leaders directly increase (ASI) the level of eco-responsibility, thereby making it a proactive problem-solving challenge. In line with that, the attitudinal pathway is motivated by inspirational motivation. Leaders communicate a green vision and turn routine service activities into a common corporate priority. This aims to engage employees' intrinsic motivation and convert compliance into MAS, while structural empowerment is created by individualized consideration (IC). Leaders meet personal growth needs by providing targeted eco-training and mentoring, resulting in employees' empowerment to take action (ETA). This puts the front-line staff on the ground in a practical position for carrying out voluntary green projects without micro-management. Moreover, by practicing the environmental behaviors they preach, leaders build corporate trust, ensuring that employee awareness, motivation, and empowerment translate directly into lasting sustainable behaviors (SBs).

Additionally, TL builds a vision within the organization, which empowers the organization in terms of environmental considerations and actions such as waste management, energy saving, water management, resource efficiency and sustainable customer service [15]. Given the importance of environmental impacts and direct customer interaction, and operational benefits of adopting green practices, TL is a crucial player in building sustainable hotels that foster carbon reduction, water management, and environmental social responsibility.

Research Framework

The research model (Figure 1) illustrates the effect of TL on SB through direct actions such as awareness, motivation, and empowerment, and on the individual and organizational levels. These mediating factors are interrelated, producing the interconnected micro and macro levels of sustainable outcomes, which show complex interdependencies rather than simple linear relationships [19,20].

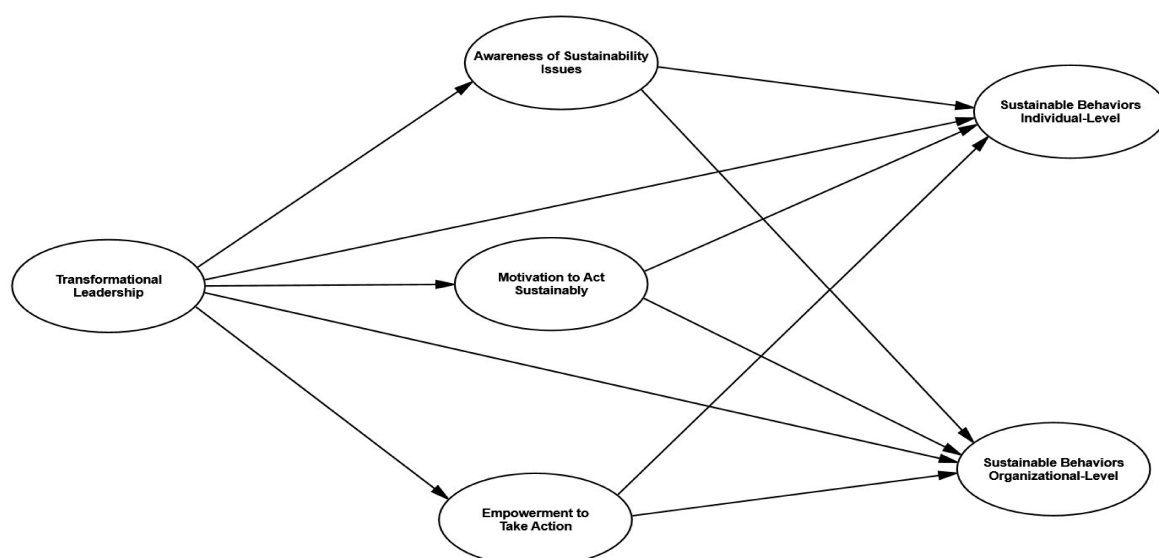


Figure 1. Research framework.

2.3. Direct Effect Hypotheses

2.3.1. TL with SB, Individual Level

Studies in the hospitality sector show that TL is a crucial predictor of the employees' pro-environmental behaviors, including waste reduction and water management [17]. Research on employee MAS and environmental actions explains why hospitality employees are engaged in organizational and employee-based behavior that supports organizational sustainability [21], indicating that environmental TL directly impacts pro-environmental behavior and employees' behavior. Also, Ref. [22] found that the TL behaviors of managers in the hospitality industry are strongly connected to the adoption of green practices by room division staff, such as towel and linen reuse programs and energy efficient cleaning methods. The findings highlight the importance of inspirational motivation and individualized consideration in guiding the individual level of SB. Consistent with this evidence, TL is a direct predictor of sustainable customer service behaviors, including informing customers about environmental initiatives and taking actions and adopting sustainability through front-line service delivery. These studies describe associations but fail to account well for the psychological mechanisms by which leadership leads to action, limiting the practical value to hotel managers trying to design interventions that will be effective. In addition, it is not known if the impact of leadership is consistent across hotel departments of varying autonomy or if it depends on factors related to the roles within each department. The present study, thus, evaluates TL as an independent predictor of individual-level SB and investigates the mechanisms that account for the effect of TL on SB. Accordingly, H1 proposes that TL has a significant positive effect on the individual level of SB.

2.3.2. TL with SB—Organizational Level

The study conducted in [23] within the hospitality industry affirmed that TL at the management level has a significant impact on the organizational-level sustainability programs, which include the use of sustainable practices, environmental management, and green policies and practices in lodging houses. Investigations conducted for [24] established that hotel general managers who embraced TL were linked to implementation of waste management policies, renewable energy policies, and sustainability-related practices. Moreover, Refs. [5,25] examined chain hotels and found that TL on the organizational level anticipated metrics of organizational environmental performance, including energy efficiency improvement, water conservation success, and waste recycling rate. Importantly, most of these studies view the organization as a single unit, and fail to consider how leadership vision is implemented at the collective level in departments operating at varying levels of resource availability and differing priorities. In theory, there is a distinction between SB at the organizational level (H2) and at the individual level (H1): The latter has a volitional, psychological component while the former is institutionally anchored and influenced by policy, norms, and collective accountability. This study provides a test of both levels individually to find out whether TL is working in different ways at each level, which previous studies have not systematically examined. In line with this, the second hypothesis is constructed in the following way: H2 proposes that TL has a tremendous impact on the sustainable level of organizational behaviors.

2.3.3. TL with ASI

Regarding hotel industries, research in [15,26] indicates that TL in the hotel industry is effective at increasing ASI using educational enterprises, inspirational messages, and message clarity via providing a vision. Their analysis of the knowledge of the hotel employees in various departments revealed that TL behaviors significantly forecasted the ASI of the employees, their comprehension of sustainability impacts, and ASI as to

environmental impacts of the hotel. In this respect, another study [27] revealed that managers of hotels that exhibited TL features were more practical in terms of carrying out ASI training programs and communicating sustainability goals to their employees. The analysis indicates that the individualized consideration and intellectual stimulation elements were very effective in the improvements; despite these contributions, the existing studies mainly measure ASI as a result of leadership and not as an active and mediating mechanism of leadership. The lack of this hinders theory of ASI in the leadership behavior chain: do people change their behavior when they become aware of it, or is there a need for motivational reinforcement? This study considers ASI as an outcome of TL and a mediator of SB (Sections 2.4.1 and 2.4.2), so this study goes beyond descriptive association to explain the process of ASI. H3 was therefore developed: TL plays a significant role in ASI.

2.3.4. TL on MAS

With an environmental approach, TL employs MAS and teamwork to motivate the employees. Research conducted for [12] observed that the inspirational motivation aspect of TL proved very successful in creating an intrinsic foundation for environmental action among the hotel staff. Additionally, other research conducted [28] has investigated the role of TL in hotels in encouraging their employees to participate more in the benefits of sustainability in the workplace. Research demonstrates that there is a relationship between TL and meaningful environmental behavior (MAS), but it is not differentiated as to whether this is intrinsic (self-driven) or extrinsic (externally pressured). This is important because, according to Self-Determination Theory, people are more likely to engage in green behaviors in the long term if they are intrinsically motivated [29]. No previous hospitality studies have empirically questioned whether TL leads to the development of intrinsic MAS or only to compliance that is contingent upon continued leadership. The present study addresses this gap by conceptualizing MAS as a mediating factor based upon motivational theory, instead of simply as a product. This source results in the development of H4, which is as follows: Employee MAS is very much affected by TL.

2.3.5. Empowerment to Take Action

TL exerts a constructive influence on employees' ETA. Empirical studies in the hotel industry demonstrate that psychological ETA significantly predicts employees' engagement in environmental improvement activities [14]. Similarly, employees under TL report higher levels of psychological ETA, encompassing competence, self-determination, meaning, and influence toward environmental initiatives. These effects are proved in the hotel industry, where TL motivates the adoption of environmental activities and innovation. ASI is a cognitive rather than motivational mechanism, whereas MAS is motivational rather than cognitive and is considered a distinct mechanism because it works through internalization, involving perceived agency and self-efficacy, which is more behavior-proximate. It is important to distinguish these three mediators from each other, as it would be redundant to hypothesize the three as similar. Accordingly, H5 proposes that TL has a positive impact on employee ETA.

2.3.6. ASI, Individual and Organizational Level

Awareness of sustainability issues (ASI) is a main player in driving behavioral change and supporting institutional sustainability actions and initiatives in hotels. Raising employees' awareness and their involvement in setting and developing the sustainability plans and actions strengthens the relationship between ASI and individual behavior, which is key for implementing a green policy [30]. Empirical research shows that employees with higher ASI are more likely to engage in individual environmentally friendly actions and behaviors, which collectively supports the organization in attaining

its sustainability goals [31]. Consistently, Ref. [32] found that ASI positively affects the employees' voluntary participation in sustainability-related actions and behaviors, such as waste management, recycling, energy saving, and the finding of sustainable solutions in the hospitality sector. These findings conclude that ASI can provide a solid foundation and base for the adoption of SB, enabling employees to move beyond passive actions, and toward active commitment.

In the hospitality sector, routine activities provide an opportunity to influence environmental results and solutions. The literature further indicates that team leaders can enhance ASI through education and motivation, enabling employees to apply sustainability principles in daily tasks and shift organizational culture from compliance-based practices toward motivation-driven sustainability. Just telling people to do something is not enough; they must be motivated and provided with the right support so they can change their behavior. Collective norm setting is a form of awareness at the organizational level, and is distinct from individual intention [31]. Accordingly, H6 and H7 propose that ASI significantly influences sustainable behavior at the individual and organizational levels.

2.3.7. MAS with Individual and Organizational SB

Employees' well-being is motivated through intrinsic motivation through their personal values or through extrinsic motivation by external factors, making them more motivated to participate in environmentally responsive actions. Subsequently, on the organizational front, the employee will be more motivated to make better contributions towards a culture of sustainability that would promote long-term environmental goals and innovations.

In addition, this is based on [29], in which the authors set forth a strong theoretical backing that demonstrates that the intrinsically inspired behaviors are better, more lasting, and adequate. Ref. [33] directly mapped this framework to the hospitality industry and found out that workers with an enhanced intrinsic MAS as to environmental action were more inclined to engage in both compulsory and optional SB. Moreover, Ref. [34] found that employees who were motivated to work in hotels were more likely to show environmental MAS, become members of sustainable teams, and promote sustainability initiatives at both the individual and group levels. While MAS is often considered in one entity, its impact on personal behavior (personal values) is different from how it affects the sustainability culture of the organization (sustainability culture across departments). MAS is also different from ASI; awareness does not lead to action if motivation is not there. In this study, the MAS is separately tested at both levels to ensure the personal and institutional are not mixed together [35]. Based on such findings, the relevant hypotheses were developed as follows: H8 and H9—motivation has a direct influence on SB at the individual and organizational levels.

2.3.8. ETA with Individual and Organizational SB

ETA is conceptualized as a multidimensional construct comprising competence, influence, self-determination, and meaning, which together strengthen employees' intrinsic motivation and capacity to engage in sustainability-related behaviors [36]. Empirical research on the hospitality sector shows that empowered employees are more proactive in identifying opportunities for environmental improvement, implementing sustainable actions, and participating in the voluntary environmental initiatives [31]. These findings are aligned with prior research findings that psychological ETA improves self-efficacy and autonomy, encouraging employees to integrate sustainability actions into routine tasks, even without direct supervision [37], and develop creative solutions for water savings and waste reduction that impact positively on the environment [38].

From a multilevel perspective in Social Cognitive Theory [39], ETA influences the sustainable actions of employees that collectively shape the organizational culture and environmental results. To give proportion to this view, Ref. [40] added that ETA predicts both individual and pro-environmental behavior; it positively affects the employee's participation in organizational sustainability-based actions. Further evidence suggests that employees are influenced towards better and enhanced communication mechanisms with ETA, and this is reflected into better managerial sustainability decisions and organizational environmental innovation [41,42]. Employees are impacted by ETA in two ways: as individuals, through their own agency, and as members of organizations, through hearing and joining in with their collective voice. Testing these individually, H10 and H11 identify the areas where empowerment to act can make the greatest contribution to sustainability. Accordingly, H10 and H11 propose that ETA will significantly influence sustainable behavior at the individual and organizational levels.

2.4. Mediating Effect Hypotheses

Moreover, according to the works in the literature, SB takes a more personalized perspective in the context of voluntary pro-environmental behaviors that are theoretically explained by Self-Determination Theory (SDT), which posits two forms of behavior: intrinsic motivation and externally regulated behavior [29]. In terms of the organizational level, SB is the institutionalization of practices within policies and work routines, and is rooted in Institutional Theory; it forces hotels to institutionalize their environmental commitments in their actions through the pressures of regulation and normative action. The key gap is between the two levels: TL establishes a vision for the environment at the organizational level and as to how the individual employees internalize and act upon that vision, which is in turn mediated by psychological mechanisms like environmental awareness and motivation towards sustainable action [6]. Fusing the two levels can lead to wrongly attributed voluntary individual green action and the wrong notion of organizational compliance, which reduces the theoretical precision required to explain sustainability transformation in hotels.

2.4.1. ASI Mediating TL Impact on SB, Individual Level

Individual agency ASI serves as a key mediating mechanism linking TL to the individual-level SB in the hospitality sector in terms of the theory of planned behavior [43], ASI creates an attitude that shapes behavioral intentions and real SB. Through intellectual inspiration, TL enhances employees' environmental awareness and the personal outlook on pro-environmental issues [44], strengthening ASI and psychological readiness by identifying the link between individual actions and environmental consequences [45]. This mediating role is further supported by value-belief-norm theory, which posits that TL positively influences ASI, reinforces personal norms, and encourages SB in areas such as waste reduction, energy savings, and resource efficiency [46].

ASI motivated by TL is particularly important to hotels' operations, as there are daily routines done by the employees that directly influence environmental performance [47,48]. Without ASI and personal commitments, employees will lack the basics of adopting voluntary pro-environmental behavior, regardless of leadership support or the hotels' strategies. Several research efforts have found correlations between TL and SB, and ASI and SB, but not between ASI and TL as a formal mediator. This study contributes in this regard by modeling ASI as a mediator that separates the cognitive pathway from motivational (MAS) and agency-based (ETA) pathways [49]. Accordingly, H6a proposes that ASI mediates the relationship between TL and the individual's sustainable behavior.

2.4.2. ASI as Mediator Between TL and SB at the Organizational Level

Referring to Social Cognitive Theory [39] and TL Theory [50], TL enhances employee ASI through individuals' actions and behaviors, which is reflected into the organization as collective effort. Ref. [51] explains the cognitive–affective process by highlighting that an employee with strong ASI is more directed to the organization goals and values under TL and are more motivated to engage in value-adding SB. Leaders adopt ASI by guiding employees to understand the broader organizational context, understand interdepartmental interdependence, and value the ways in which their actions impact on organizational results [52]. In hotel settings, where service quality depends on collective efforts across departments, ASI becomes a priority for cooperative performance [53,54]. Accordingly, TL strengthens ASI through transparent communication and role modeling, and by calling for a shared vision and responsibility. The mechanism and level of H7a differs from H6a, which is personal norms vs. collective sense-making and institutionalization, respectively. Modeling them separately helps avoid masking level-type effects and helps to better pinpoint where interventions are most impactful, leading to the formulation of H7a, which proposes that ASI mediates the relationship between TL and organizational-level SB.

2.4.3. MAS, as Mediator Between TL and SB—Individual and Organizational Levels

TL positively influences individual SB by building continuous accountability among the employees, which in turn improves organizational SB [55,56]. TL shows the importance of sustainability and motivates employees to internalize friendly environmental actions through intellectual stimulation and inspirational motivation, so this strengthens MAS and commitment to environmentally friendly behaviors [49]. Supporting this, Ref. [57] found that TL enhances employee MAS, leading to voluntary environmentally friendly behaviors such as energy savings and waste reduction, which falls under organizational sustainability.

From a mediating angle, Self-Determination Theory suggests that leaders who continuously support their employees' needs and competence are more likely to be engaged in environmental issues [40,56]. Prior studies show that transformational leaders who emphasize environmental values and create enabling systems motivate employees' MAS, resulting in more consistent and more competent individual SB [57,58]. MAS is a motivational internalization, unlike ASI (which is a cognitive awareness). It is possible to be aware and not motivated, so that the two can be complementary, but not overlapping. An ASI and MAS test indicates that employees know, or want to change, while testing MAS alone gives insights into the latter. Accordingly, H8a and H9a propose that MAS mediates the relationship between TL and sustainable behavior at the individual level.

2.4.4. ETA as Mediator Between TL and Individual and Organizational SB

Self-leadership theory shows that leaders who motivate and inspire their employees develop better work conditions that encourage employees' environmental self-efficacy to ETA, which promotes SB [59]. Empirical evidence supports this view, showing that TL strengthens employees' competence and self-efficacy through intellectual stimulation and inspirational motivation, positioning psychological ETA as a key mediator in the leadership–sustainability relationship [60]. Similarly, TL indirectly influences individual environmentally friendly behaviors through ETA, enabling employees to engage in sustainable activities such as waste reduction and voluntary environmental initiatives [61].

This mediating roles are extended to the organizational level, at which TL improves the organizational SB through collective ETA [51]. Multilevel proofs show that collective psychological ETA mediates the relationship between TL and organizational environmental performance [55], with hotel studies confirming stronger sustainability results

when employees' ETA is higher. Adding on self-determination and social-cognitive theories, TL fosters ETA through intellectual stimulation, inspirational vision, and individualized consideration, increasing self-efficacy and motivation to engage in environmental actions [31,39,62]. ETA provides perceived capacity and structures support for action, while ASI is raising awareness and MAS is building motivation. The three pathways (cognitive (ASI), motivational (MAS), and (ETA)) provide a more comprehensive model of how TL leads to sustainable behavior than any one pathway alone, and each pathway is unique and can be acted upon in leadership practice. Accordingly, H10a and H11a propose that ETA mediates the relationship between TL and SB on the individual and organizational levels.

3. Methodology

This part illustrates the methodology employed in this research. A quantitative method was applied to explore the influence of TL on SB (individual-level and organizational-level) in the Jordanian hotel industry. Additionally, this research explores the psychological factors that enable SB, specifically ASI, personal MAS, and a sense of ETA, functioning as interconnected mechanisms. To gather data, we distributed structured surveys to a carefully selected group of 338 middle and lower-level managers. These answers were analyzed by using Partial Least Squares Structural Equation Modeling (PLS-SEM); this technique is suitable to examine complex relationships.

3.1. Method

The research has used purposive sampling to survey experienced employees in five-star hotels in Jordan; the employees had to have at least one year of work experience. Five-star hotels across Jordan were contacted, and management approvals were obtained through meetings and by explaining the study's needs and purpose. Taking into consideration that nonprobability samples may involve bias, the deliberate limitation to the five-star properties points to theoretical and contextual considerations. The five-star hotels constitute the segment with the highest chance of achieving the manifestation of how major behavioral components of transformational leadership impact on sustainable practices, including the downstream side effect of the behavior, as they show increased international sustainability standards, increased institutional environmental reporting requirements and increasingly formal management hierarchies [3,9]. This categorization is also the context for the highest expectations of customers and the most rigorous regulatory review, theoretically providing the best basis for analyzing the connection of leadership to structured sustainability commitments [1]. The four locations, Amman, the Dead Sea, Petra and Aqaba, were chosen because they have the highest concentration of five-star properties in Jordan, thus providing the ideal geographic dispersal for encompassing all aspects and surrounding areas of the range of possible hospitality operating environments, including urban commercial, heritage, rural resort and coastal areas; additionally, they represent the bulk of Jordan's international tourism, meaning the study will capture the most strategic and sustainability-focused part of the national hospitality industry.

Data were collected from 41 five-star hotels distributed across four major tourist areas in Jordan: Amman (18 hotels), the Dead Sea (9 hotels), Petra (7 hotels), and Aqaba (7 hotels). Of the 41 hotels, 27 (65.9%) are affiliated with international hotel chains (including properties operating under Marriott, Hilton, Hyatt, Starwood/Sheraton, and IHG brands), while 14 (34.1%) are independently operated luxury properties. Hotel sizes range from approximately 120 to 450 rooms, with a mean of approximately 220 rooms. This composition reflects the landscape of five-star hospitality in Jordan, where internationally branded chain properties co-exist with domestic luxury independents, providing a representative basis

for examining TL–SB dynamics within a nationally bounded but internationally influenced industry context.

Data were gathered from hotels located in the capital, Amman, and the Dead Sea, Petra, and Aqaba, which are considered major tourist destinations in Jordan, with the total number of employees reaching approximately 10,900 employees across 41 hotels. Between mid-November 2025 and 15 January 2026, 500 questionnaires were distributed through on-site visits, face-to-face meetings, and follow-ups via phone and texting. A total of 379 responses were received (76% response rate), of which 44 were excluded due to incompleteness, resulting in 338 valid questionnaires.

The final sample exceeds the minimum requirements for PLS-SEM. According to [63,64], models with five latent variables and 29 indicators require 150–200 cases. Therefore, the sample provides sufficient statistical power for analysis using Smart-PLS and SPSS 27.

Purposive sampling was used to achieve a representative sample of respondents who had adequate organizational exposure to formal leadership practices and institutionalized sustainability efforts in place. Employees in the sample included only those who had served as employees for at least one year of continuous work at five-star hotels (theoretically the best place to look at the TL–SB relationship). Five-star hotels in Jordan have formal structures of sustainability governance arrangements, are required to meet several international environmental certification requirements, and have systematic programs for leadership development, the essential conditions for the proposed mediating mechanisms (ASI, MAS and ETA) to be systematically activated. To ensure the maximum theoretical differences in the highest number of critical constructs, the chosen goal of the research was to increase the construct validity of the selected context, in line with the theory-testing purpose of PLS-SEM explained by [64,65]. The geographic scope consisted of Amman, the Dead Sea, Petra and Aqaba due to the presence of five-star hospitality infrastructure in Jordan. The four destinations together represent the majority of Jordan's five-star classified hotel accommodation and as a group represent a variety of service settings, including urban areas and resorts, meet the requirements for a heritage tourism operation, and capture variability in terms of employee roles, size of operation, and level of maturity of their sustainability programs. Some limitations regarding the sampling methodology became evident to the authors. First, the results obtained from the five-star category sample do not generalize to the mid-scale (three- and four-star) hotel category because the degree of formalization of leadership and intensity of sustainability programmers vary significantly between these types of hotels. This trade-off speaks for itself, as the study is conducted in a context within which the theoretical mechanisms to be measured and studied are likely to be present. Second, by limiting the geographic focus to the four cities with the majority of the five-star-classified hotel capacity in Jordan, the study does not represent the hotels in secondary regions, which present different leadership cultures and sustainability practices. These limitations on external validity are recognized and explicitly mentioned in Section 6 (Limitations). To assess the possibility that each of the constructs may be influenced by the participant's demographic characteristics, four demographic control variables (age, gender, level of education, and years of work experience) were added to the models in respective complementary PLS-SEM analyses as additional predictors of both outcome constructs. All of these variables exhibited relationships that were not statistically significant for Individual-Level Sustainable Behavior (all β values ranged from -0.06 to 0.07 ; all p values > 0.05) or Organizational-Level Sustainable Behavior (all β values ranged from -0.06 to 0.05 ; all p values > 0.05). This result aligns with previous studies in which leadership and psychological factors are included in the model, which have shown that

demographic factors only indirectly impact employee sustainability practices through these other variables [25,31].

3.2. Data

All measurement items were adopted from the existing literature, and have undergone validation concerning the six constructs of the study. Transformational leadership (TL) was assessed with 12 items from Multifactor Leadership Questionnaire (MLQ; [50]) addressing the four canonical dimensions—idealized influence, inspirational motivation, intellectual stimulation and individualized consideration, with modification to the items to fit the context of the hospitality industry. Individual-level sustainable behavior (SBI; 4 items) was designed to assess pro-environmental activities that the participant chooses to perform, such as reducing waste, conserving energy, managing resources and engaging in recycling. Some of these items were adapted from [49,57]. Setting-level Sustainable Behavior (SBO; 4 items) was reworded and adapted from [15,22], which probes the perceptions of the hotel-level sustainable performance and institutionalized sustainability commitments.

Awareness of Sustainability Issues (ASI; 3 items) was created based on the work of [25], and indicates employees' knowledge about the impacts occurring at the hotel and the need for sustainability. The items for Motivation to Act Sustainably (MAS; 3 items) were adapted from [6,57], to dip into intrinsic and extrinsic motivations to take pro-environmental action at the workplace. Empowerment to Take Action (ETA; 3 items) was adapted from the notion of the psychological empowerment scale of [36], as applied to the hospitality environment, with the dimensions of competence to take action, self-determination, meaning, and influence towards sustainability-oriented work behaviors, as carried out in [14]. Each item was scored on a 5-point Likert scale (where 1—strongly disagree and 5—strongly agree). The full checklist is in Supplementary Materials. Given the requirement for Arabic-speaking employees in Jordanian five-star hotels to be the target population, all instruments were translated and culturally adapted systematically to make sure that both their linguistic and semantic equivalents are identical in the target language and their sources in English. It was believed that the identity of the target population, Arabic-speaking employees working in five-star hotels in Jordan, implied that the instruments needed to be systematically translated and culturally adapted to make sure that both their linguistic and semantic equivalents are identical in the target language and in the source language (English). In forward translation (also referred to as direct translation), the complete instrument was translated into Arabic language independently by two bilingual academics who have expertise in organizational behavior and hospitality management.

A joint review session took place, which resulted in a “reconciled” Arabic version of the two drafts. In the second stage (back-translation) another independent bilingual translator, who had had no contact with the original instruments, was asked to translate the same Arabic draft back into English. The research team, item-by-item, compared the back-translated text with the original instruments, and five items in the sections pertaining to TL, ASI and MAS showed minor semantic differences in their translation and were updated together through consensus discussion, which resulted in full equivalence. The third stage involved a literature-based expert panel review, and review by five experts: three academic researchers with an active research program in sustainability management and organizational behavior and, from Amman, two senior managers of the five-star hotels who were responsible for the environmental operations, with direct responsibility in environmental operations. All items were rated separately by each evaluator, and the Content Validity Index (CVI) procedure as recommended by [66] was used. The items identified as having CVI scores below 0.80 were marked for revision, out of which three items (one in each of the three subscales; TL, ETA, and SBO) received the feedback of the

evaluators as to revision terms that are aligned with the Jordanian hotel practice. The evaluators also gave qualitative comments on culture, which resulted in slight changes in wording for two other ETA items. Again, no items were deleted at this stage.

3.3. Model Development

Partial Least Squares Structural Equation Modeling (PLS-SEM) [67] was used in this study to verify the hypothesized structural relations. Four methodological criteria were taken into consideration when selecting PLS-SEM methodology over covariance-based SEM (CB-SEM) [64,68]. First, the study's orientation is toward prediction and explanation of variance in individual and organizational sustainable behavior, rather than toward strictly confirmatory testing of an a priori factor structure, as is more typical of a confirmatory framework such as CB-SEM's maximum likelihood estimation [64,69].

Second, the structural model has five latent constructs connected with each other, with six direct effect paths and six indirect mediation effect paths through three competing mediators, whereas CB-SEM struggles with non-convergence at this level of complexity (the PLS-SEM analysis is more stable, and the parameters converge better [68]). Third, item-level distribution inspection showed the existence of non-normal properties (skewness, and/or kurtosis values greater than (1.0)) for three of the six constructs, adversely impacting the assumption of multivariate normality for maximum-likelihood estimation in CB-SEM, which was performed with distribution-free and violation-resistant procedures using a bootstrap [64]. Fifth, the three mediating constructs (ASI, MAS, and ETA) are each composed of three items, which is below the five to seven recommended for CB-SEM to reliably identify a construct [64,70]. The goodness-of-fit measurement of the model was assessed by the Standardized Root Mean Square Residual (SRMR), suggested as the main goodness-of-fit index for PLS path analysis model [71].

The model composite SRMR was 0.064, which is slightly lower than the general guideline of 0.08 [71,72]. The Normed Fit Index (NFI) was 0.765, which is near the recommended threshold of >0.90, as suggested by [73]. Fit statistics support the conclusion that the proposed model is a reasonably good representation of the observed data covariance structure. Empirical bootstrapping (resampling 5000, compared to 1000 in the original analysis) [64,74] bias-corrected, and accelerated (BCa) 95% confidence intervals were employed for the estimation of all path coefficients. Standardized path-coefficients (β) are reported with the corresponding bootstrapped *t*-statistics and 2-tailed *p*-values. In addition to the *p*-values, for indirect effects BCa, 95% confidence intervals are reported to allow for direct evaluation of whether indirect effects exclude zero [74]. All results and their interpretations are made in associational terms and in keeping with the cross-sectional design of the study. To further diagnose the potential influence of common method bias, an unmeasured latent method construct (ULMC) analysis was conducted, following [75]. The results indicate that substantive variance substantially exceeds method variance across all indicators, providing additional evidence that common method bias does not materially distort the study's structural estimates.

3.4. Common Method Variance (CMV)

All constructs in the study were assessed by self-administered questionnaires in a single measurement period, which makes the study susceptible to common method variance (CMV) and the likelihood of spurious statistical significance [76]. Both procedural and statistical approaches were employed to assess and mitigate this risk. To minimize method-induced bias, several decisions were made as to the design of the questionnaires. To reduce psychological contiguity between predictor items (TL) and outcome items (SB Individual Level and SB Organizational Level), and to minimize priming effects, the questionnaire

instrument positioned the ASI, MAS and ETA in the questionnaire instrument in-between the antecedent and outcome measures. Second, participants were expressly assured of anonymity and told that the survey was not an attempt to evaluate their performance and contained no right or wrong answers, limiting social-desirability bias and evaluation apprehension. Third, the survey was designed and administered as an independent academic study, which further minimized organizationally driven response distortion. Three complementary diagnostic procedures were used at the statistical level. The first was the single common factor test from [77], which was conducted by entering all 29 indicators into principal component analysis in the SPSS 27 program, and then looking at the unrotated factor solution.

The first unrotated factor accounted for 48.379% of the total variance, which is less than 50%, so there is initial evidence that no single method factor is dominant in producing covariance in the data. Second, the Variance Inflation Factor (VIF) values were checked against recommendation in [78] for PLS-SEM, where structural VIF values higher than 3.3 for the set of endogenous (dependent) constructs predicted by one of its exogenous (independent) constructs suggest possible CMV inflation. The maximum value of the structural VIFs in the current model was 3.56, which slightly exceeds the 3.3 critical value used for diagnostics but is well below the accepted value for multicollinearity [64]. Critically, the slightly higher VIF by path in ASI is probably expected from theory: ASI, MAS and ETA are conceptually and substantively close enough to each other to be viewed as proximal proxies of a closer relationship between TL and SB, which is not likely to be CMV induced. Likewise, VIF values were 1.00 in the case of TL-to-mediator paths, which indicated no collinearity at the mediator level.

Third, the inter-construct correlation matrix was checked for evidence of the uniform inflation pattern expected for CMV-contaminated data. If there is very high CMV, all inter-construct correlations are likely to look much like the average reliability coefficient of the constructs, and they will all be reasonably high [76]. The observed values in the range from 0.682 (TL–ETA) to 0.797 (ETA–SB Individual Level) and the significant differences between the higher and lower values among the correlation pairs do not seem to support a uniform method factor interpretation. The procedural controls and statistical diagnostics can be used together and will give reasonable assurance that there is no common method variance that threatens the validity of the findings. There are inherent constraints with using the cross-sectional, “one-source” design that we cannot completely overcome. Multi-time point collection of data, supervisor-ratings of at least one construct, or marker variable analysis [75] would be useful in future studies to address this issue more rigorously.

4. Results

4.1. Descriptive Analysis

Table 1 presents the demographic characteristics of the sample. The respondents were predominantly young and mid-career employees, with the largest proportion aged 26–35 years (42.0%), and had work experience of 4–7 years (39.6%). The sample showed a relatively balanced gender distribution, with males representing 56.8%. Most respondents held a bachelor’s degree (59.5%), followed by a high school diploma (31.7%). In terms of departmental distribution, 74.5% of respondents worked in revenue-generating departments, namely Food and Beverage (40.2%) and Rooms Division (34.3%). Participants were middle-level supervisors and front-line operational employees working in five-star hotels in Jordan, drawn primarily from the Food and Beverage (40.2%) and Rooms Division (34.3%) departments, with additional representation from operational support departments (16.9%) and administrative functions (8.6%). This sample composition reflects the organiza-

tional levels at which daily sustainability decisions are most directly executed and most amenable to leadership influence.

Table 1. Demographic profile ($N = 338$).

Demographic Variable	Category	Frequency	Percentage (%)
Age	18–25 years	98	29
	26–35 years	142	42
	36–45 years	72	21.3
	46 years and above	26	7.7
Gender	Male	192	56.8
	Female	146	43.2
Education Level	High School and Diploma	107	31.7
	BA	201	59.5
	Master’s Degree or Higher	30	8.9
Work Experience	1–3 years	121	35.8
	4–7 years	134	39.6
	8–12 years	62	18.3
	More than 12 years	21	6.2
Position	Operational dep. (e.g., Front office, HK)	57	16.9
	R D	116	34.3
	F&B	136	40.2
	Admins	29	8.6
Total Respondents		338	

Source: SPSS output.

4.2. Measurement Model Results

4.2.1. Reliability and Convergent Validity

Reliability and validity of measurement scales were thoroughly checked and analyzed as to the structural relationships. Table 2 shows that all constructs have high internal consistency levels with Cronbach Alpha and Composite Reliability scores comfortably above 0.70. Averaged Variance Extracted (AVE) values were used to determine convergent validity, and all of them exceeded 0.50 [79,80]. The five constructs had AVE scores ranging from 0.705 to 0.773, meaning that they had very good convergent validity, and TL (AVE = 0.575) passed an acceptable threshold. In order to further examine the indicator loading in Table 3, it was determined that all items had significant loading on their own respective constructs, with most having an ideal loading of 0.70 or higher [64]. Also, none of the values of VIF were higher than 5, which does not raise any suspicion of multicollinearity among the indicators. Such an extensive test ensures that the measurement model is reliable and valid and therefore there is a strong basis that will be used in further analysis of structural relationships.

Table 2. Internal consistency reliability.

	Cronbach’s Alpha	rho_A	CR	(AVE)
ASI	0.81	0.82	0.89	0.73
ETA	0.85	0.85	0.91	0.77
MAS	0.84	0.84	0.90	0.76
SB_Organizational Level	0.80	0.80	0.88	0.72
SB_Individual Level	0.86	0.86	0.90	0.70
TL	0.87	0.87	0.90	0.57

Source: Smart-PLS output.

Table 3. Convergent validity.

Construct	Item	Outer Loading	t-Value	VIF
ASI	AS1	0.812	27.867	1.580
	AS2	0.875	41.82	2.075
	AS3	0.882	63.687	2.062
ETA	ET1	0.853	52.326	1.830
	ET2	0.885	42.696	2.308
	ET3	0.902	69.665	2.442
MAS	MS1	0.845	45.648	1.922
	MS2	0.907	73.913	2.535
	MS3	0.870	63.278	1.990
SB—Organizational Level	SBO1	0.814	30.297	1.537
	SBO2	0.872	63.486	2.025
	SBO3	0.867	64.048	1.953
SB—Individual Level	SBi1	0.827	26.355	1.976
	SBi2	0.875	62.018	2.444
	SBi3	0.880	55.076	2.399
	SBi4	0.776	23.926	1.668
TL	TLic1	0.812	41.51	1.975
	TLic2	0.748	29.098	1.747
	TLic3	0.758	25.725	1.791
	TLim1	0.778	29.678	1.981
	TLis2	0.753	25.483	1.765
	TLis3	0.825	27.731	2.22

Six TL items (two per dimension: TLi1, TLi2 from Idealized Influence; TLim2, TLim3 from Inspirational Motivation; TLis1 from Intellectual Stimulation; and TLic4 from Individualized Consideration) were excluded from the final measurement model due to outer loadings below the 0.70 threshold (range: 0.61–0.69). Their exclusion improved overall model fit without substantively altering the theoretical content coverage of the TL construct.

4.2.2. Assessment of Discriminant Validity

Discriminant validity was employed to confirm the uniqueness of the model constructs. The Fornell–Larcker criterion [81] has been used to ensure that the constructs have more variance with their own indicators than with any other construct in the model. As shown in the results in Table 4, the square root of the AVE of each construct (diagonal values) is higher than all the inter-construct correlations (off-diagonal values). Thus, for instance, the AVE root of ASI (0.857) exceeds its correlations with MAS (0.763) and ETA (0.728), which will help to keep concepts conceptually apart. This result is also supported on the indicator level, because all the items were loaded more on the desired constructs than on other ones, which is a good outcome, as per the established guidelines [64].

Table 4. Discriminant validity [81].

Construct	1	2	3	4	5	6
1 ASI	0.858					
2 ETA	0.727	0.878				
3 MAS	0.764	0.745	0.8745			
4 SB_Organizational Level	0.718	0.741	0.767	0.86		
5 SB_Individual Level	0.751	0.797	0.748	0.761	0.85	
6 TL	0.796	0.682	0.758	0.732	0.735	0.776

Source: Smart-PLS output.

4.3. Structural Model Results

4.3.1. Assessment of Multicollinearity

We also evaluated the possibility of multicollinearity of the predictor variables before assessing the structural relationships. Table 5, showing the Variance Inflation Factor (VIF) values, shows that multicollinearity is not an issue with our model. For the paths that predict SB, the VIF values are 2.63–3.56. Although this indicates anticipated correlations in the complex models of behavior, all values still lie far below the conservative value of 5 [64]. Also, interestingly, the paths between TL and the mediating variables (ASI, ETA, and MAS) have a VIF of 1.00, which reflects the lack of multicollinearity between these two basic connections. All of these findings provide confirmation that the model is statistically valid, and the interpretation of the following path coefficients can be made accurately without the bias of mutually related predictors.

Table 5. Multicollinearity assessment (VIF).

Path	VIF
ASI -> SB—Organizational Level	3.562
ASI -> SB—Individual Level	3.562
ETA -> SB—Organizational Level	2.631
ETA -> SB—Individual Level	2.632
MAS -> SB—Organizational Level	3.265
MAS -> SB—Individual Level	3.267
TL -> SB—Organizational Level	3.252
TL -> SB—Individual Level	3.252
TL -> ASI	1.001
TL -> ETA	1.001
TL -> MAS	1.001

Source: Smart-PLS output.

4.3.2. Structural Model Explanatory Power

R-squared values were used to test the model's ability to explain the key outcome variables, and the results are presented in Table 6. The analysis's findings indicate the considerable variability in the strong explanatory power of the key constructs, following established benchmarks [64]. The model is shown to have strong predictive ability for the results of SB. As for Individual-Level Sustainable Behavior, in this case, the R^2 value of 0.725 indicates that predictors can explain about 72.5% of the variance, which is close to the threshold for significant explanatory power. Likewise, Organizational-Level Sustainable Behavior has a high R^2 of 0.683, which implies that the model explains almost 68% of the variation in practices within the organization. There is also meaningful explanatory power in the psychological mechanisms: ASI ($R^2 = 0.636$) and MAS ($R^2 = 0.575$) demonstrate moderate to strong explanatory levels, whereas ETA ($R^2 = 0.462$) demonstrates moderate illustrative power.

Table 6. Coefficient of determination (R-Squared).

	R Square	R Square Adjusted
ASI	0.635	0.636
ETA	0.463	0.462
MAS	0.574	0.573
SB_Organizational Level	0.682	0.680
SB_Individual Level	0.724	0.723

Source: Smart-PLS output.

4.3.3. Testing Hypotheses

Direct Hypothesis Test Analysis

The direct relationships of the proposed model are reported in Table 7 and illustrated in Figure 2. The results provide strong support for the role of TL. Specifically, TL shows significant direct effects on ASI (ASI; H3: $\beta = 0.798$, $p < 0.001$), managerial affective subordinates (MAS; H4: $\beta = 0.758$, $p < 0.001$), and ETA (H5: $\beta = 0.680$, $p < 0.001$). TL also exerts significant but comparatively weaker direct effects on individual-level SB (H1: $\beta = 0.197$, $p < 0.001$) and organizational-level SB (H2: $\beta = 0.234$, $p < 0.001$), indicating that its primary influence operates through mediating mechanisms.

Table 7. Result of hypothesis testing (direct).

Hypotheses	β Value	Mean	SD	T Value	p Values	95% CI Lower	95% CI Upper
H1 TL -> SB Individual Level	0.196	0.198	0.057	3.527	0.001	0.086	0.310
H2 TL -> SB Organizational Level	0.235	0.24	0.055	4.173	0.000	0.132	0.348
H3 TL -> ASI	0.797	0.798	0.026	29.073	0.000	0.747	0.849
H4 TL -> MAS	0.756	0.758	0.031	24.988	0.000	0.697	0.819
H5 TL -> ETA	0.681	0.677	0.044	15.867	0.000	0.591	0.763
H6 ASI -> SB Individual Level	0.162	0.156	0.072	2.277	0.025	0.015	0.297
H7 ASI -> SB Organizational Level	0.082	0.075	0.064	1.325	0.197	−0.050	0.201
H8 MAS -> SB Individual Level	0.152	0.157	0.053	2.924	0.003	0.053	0.261
H9 MAS -> SB Organizational Level	0.312	0.312	0.065	4.88	0.000	0.185	0.440
H10 ETA -> SB Individual Level	0.432	0.433	0.064	6.644	0.000	0.308	0.559
H11 ETA -> SB Organizational Level	0.29	0.29	0.057	5.028	0.000	0.178	0.402

Note: 95% CI computed as mean $\pm 1.96 \times$ SD from 5000 bootstrap subsamples. CI includes zero (non-significant). β = path coefficient; SD = standard deviation.

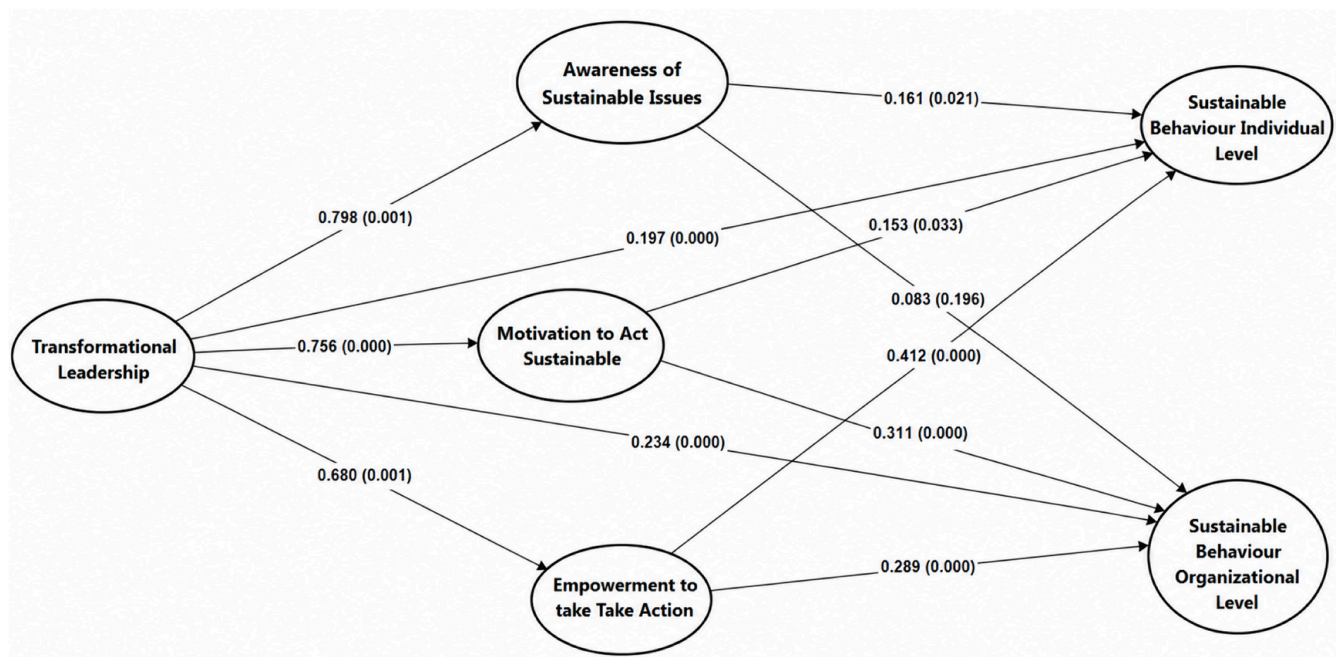


Figure 2. The structural model testing results.

Among the mediators, ETA demonstrates the strongest effects, significantly influencing both individual-level SB (H10: $\beta = 0.433$, $p < 0.001$) and organizational-level SB (H11: $\beta = 0.289$, $p < 0.001$). MAS also shows significant effects on individual-level SB (H8: $\beta = 0.153$, $p = 0.004$) and organizational-level SB (H9: $\beta = 0.311$, $p < 0.001$), with a stronger impact at the organizational level. In contrast, ASI significantly predicts individual-level SB (H6: $\beta = 0.161$, $p = 0.023$) but does not have a statistically significant effect on organizational-level SB (H7: $\beta = 0.083$, $p = 0.189$), suggesting that knowledge alone is insufficient to drive systemic sustainability outcomes without accompanying empowerment and motivation.

Indirect Hypothesis Test Analysis

The indirect effects of TL on SB are presented in Table 8 and reflect the mediating mechanisms that TL has on SB. The findings indicate that the primary role of TL is through the psychological state of employees, with the strengths of the mediators being varied. The results for ETA show the highest direct effects for hypotheses H10a and H11a and also highly significant indirect effects on both individual-level SB and organizational-level SB ($p < 0.001$). This is the largest of the indirect paths in the model and provides a good focus for employee empowerment as an important leadership development tool. MAS also has a meaningful mediation effect and has a larger indirect effect on organizational-level SB (H9a: $p < 0.001$) compared to individual-level SB (H8a: $p = 0.004$). This suggests that motivational and inspirational leadership behaviors are especially important for collective outcomes of sustainability. Nonetheless, ASI plays a more limited mediating role; hypothesis H6a is supported, meaning that ASI has an indirect effect (moderate) on individual-level SB ($p = 0.025$), while the hypothesis H7a is not supported, meaning that the mediation of individual-level SB by ASI is not significant ($p = 0.186$). Finally, the results show a clear mediation hierarchy in which ETA is the strongest mechanism, MAS facilitates collective organizational action and ASI represents an important but preliminary step. These findings demonstrate that good sustainability leadership is indeed an active enabler and motivator of employee behavior sufficient to achieve sustainable change within the organization.

Table 8. Result of the hypothesis testing (Indirect).

Hypotheses		β Value	Mean	SD	T Value	p Values	CI	
							95% CI Lower	95% CI Upper
H6a	TL → ASI → SB_Individual Level	0.127	0.125	0.058	2.247	0.026	0.011	0.244
H7a	TL → ASI → SB_Organizational Level	0.065	0.062	0.055	1.324	0.187	−0.035	0.175
H8a	TL → MAS → SB_Individual Level	0.117	0.118	0.044	2.903	0.003	0.04	0.197
H9a	TL → MAS → SB_Organizational Level	0.237	0.237	0.05	4.785	0	0.16	0.336
H10a	TL → ETA → SB_Individual Level	0.295	0.295	0.046	6.516	0.001	0.201	0.398
H11a	TL → ETA → SB_Organizational Level	0.195	0.198	0.042	4.827	0	0.115	0.247

Note: 95% CI computed as mean $\pm 1.96 \times$ SD from 5000 bootstrap subsamples. = CI includes zero (H7a and H7: ASI → SB Organizational pathway, confirming non-significance). β = path coefficient.

4.3.4. The Analysis of the Effect Size

Effect size (f^2) analysis is used to gain insight into the relative impact of each predictor, as can be seen in Table 9. The results show that TL has significant impacts on psychological mediators, especially on ASI ($f^2 = 1.749$) and MAS ($f^2 = 1.353$), which are well beyond Cohen's recommended cut-off points for large effect sizes [82]. The direct effect of TL on sustainable behavior (SB) is, however, very small ($f^2 < 0.06$), which provides further evidence that the effect of TL is mediated. ETA is the most robust mediator identified, having a medium-to-large effect on individual-level SB ($f^2 = 0.259$) among the mediators. On the other hand, the direct impacts of MAS and ASI on final-outcome variables is small, meaning that how they end up affecting sustainability outcomes mainly relies on the enabling role played by ETA.

Table 9. Effect size (f^2).

Predictor	Criterion	f^2
TL	ASI	1.748
TL	ETA	0.858
TL	MAS	1.354

Table 9. *Cont.*

Predictor	Criterion	f ²
TL	SB Organizational Level	0.055
TL	SB Individual Level	0.042
ASI	SB Organizational Level	0.007
ASI	SB Individual Level	0.025
ETA	SB Organizational Level	0.11
ETA	SB Individual Level	0.260
MAS	SB Organizational Level	0.093
MAS	SB Individual Level	0.027

Source: Authors' own work—Smart-PLS output.

4.3.5. PLS Predict and Bootstrap Confidence Intervals

Following the recommendation of [83], a PLS predict analysis was conducted to assess the model's out-of-sample predictive validity (Table 10). Using a 10-fold cross-validation procedure with 10 repetitions, the following results were obtained:

Table 10. PLSpredict Results (10-fold cross-validation, 10 repetitions).

Construct	RMSE	MAE	Q ² _Predict	Interpretation
ASI	0.539	0.412	0.609	High predictive accuracy
MAS	0.539	0.418	0.551	Moderate-high accuracy
SB_Org	0.553	0.429	0.501	Moderate accuracy
SB_Ind	0.564	0.419	0.501	Moderate accuracy
ETA	0.561	0.434	0.403	Acceptable accuracy

Note: Q²_predict > 0 indicates predictive relevance. Q²_predict > 0.50 is interpreted as medium-to-high predictive accuracy [83]. RMSE = Root Mean Squared Error; MAE = Mean Absolute Error.

All five endogenous constructs yield positive Q²_predict values, confirming that the model exhibits meaningful out-of-sample predictive relevance across all outcome variables [83]. ASI achieves the highest predictive accuracy (Q² = 0.609), consistent with TL's exceptionally strong and direct effect on awareness ($\beta = 0.797$). MAS (Q² = 0.551); SB_Org (Q² = 0.501), and SB_Ind (Q² = 0.501) both demonstrate moderate-to-strong predictive accuracy, with values above the 0.50 threshold. ETA achieves acceptable predictive accuracy (Q² = 0.403), which is noteworthy given that psychological empowerment is inherently more sensitive to individual-level variation and contextual factors beyond the model's scope. Based on the above discussion, the PLS predict analysis confirms the model's out-of-sample predictive validity. All Q²_predict values are positive, and four of five constructs exceed the 0.50 threshold for medium-to-high predictive accuracy [83]. These results indicate that the model generalizes beyond the estimation sample and provides a substantively meaningful account of sustainable behavior in the Jordanian hotel context, not merely an in-sample fit.

5. Discussion

The results show the mechanism that links TL with sustainable behavior (SB) at the individual and organizational levels in the Jordanian hospitality industry is complex and multi-layered. Transformational pathways to the variables are statistically significant, with TL having robust relationships to Awareness and Sustainable Intention (ASI; $\beta = 0.798$ $p < 0.001$), and to Motivation to Act Sustainably (MAS; $\beta = 0.758$ $p < 0.001$) and Environmental Training and Autonomy (ETA; $\beta = 0.680$ $p < 0.001$). Leaders inspire eco-innovation and psychological realignments, as reflected in recent boundary-condition

literature in the field of the hospitality industry [84,85], by turning a green vision into an individual thought of concern and intellectual stimulation.

But, in addition to descriptive results, the statistical roles of the mentioned pathways suggest theoretical understandings. Most significantly, ETA is the most important and direct mediator of final sustainable behavior, much more so than psychological motivation (MAS) and cognitive awareness (ASI). The abstract values of the environment and inner desires are easily blocked by the urgent needs of daily services in the high-speed and high-risk environment of front-line work in hospitality. Access to resources is a need for front-line personnel, and in addition to that, there should be formal decision-making powers, enabling staff to carry out eco-friendly adjustments in a dynamic way. The formal training and autonomy that are essential for shifting passive green consciousness to active green consciousness in the workplace are met well by ETA [86].

On the other hand, the non-significant direct relationship between ASI and organization-level sustainable behavior is understandable, because the results of this study suggest that there is a significant indirect relationship between the two. The latter is understandable, as the results of this study indicate that there is an indirect relationship between ASI and organization-level sustainable behavior that is significant. This is an important discovery that reflects a “cognitive-behavioral gap” or “value-action gap” within the organization. Although transformational leaders can be very good in increasing the individual cognitive awareness (ASI) and green intentions, individual cognitive awareness is not enough to affect institutional outcomes at the firm level. Without structural integration, individual environmental knowledge remains an unactualized sentiment. Individual awareness needs to be transferred to organizational performance at the collective level through organizational transmission mechanisms like infrastructure support and decentralized policies [87].

These paths are extremely dependent on the socio-cultural and practical setting of the hospitality industry in Jordan. The power-distance dimensions and top-down, centralized command structures that are traditionally associated with local hotel employees mean that few individuals take any voluntary action without permission from the executives [88]. Additionally, the importance of this issue in the context of operation in an environment with pronounced environmental risks (including acute water scarcity and unstable energy prices) is paramount and requires operational support in a structured manner. The formal training, coupled with decentralized autonomy (ETA), can therefore be interpreted as strong organizational support, since traditional management approaches often lead to bureaucratic friction. This structural empowerment removes barriers to green actions imposed by local authorities and explicitly authorizes and psychologically enables front-line workers to implement green initiatives seamlessly. Therefore, it is crucial for hospitality companies to change from passive supervision to active psychological empowerment of their employees, which includes having front-line employees be part of the hotel’s decision-making process as to sustainability. This research theoretically extends the green hospitality discourse from the West, while empirically, it confirms the paths in the given specific culture of the hotel sector in Jordan. It is a critical boundary test as it demonstrates trans-cultural universalism of some aspects of transformational leadership, namely, inspirational motivation, and intellectual stimulation. Furthermore, the results also support the theories of institutional and psychological empowerment, as the study revealed that to make the vision of the leader realized within the sustainability of the company in the long term, it is necessary to strengthen the leader’s empowerment through structural ETA.

Overall, the theoretical underpinning of this study started as a multi-dimensional construct, known as TL, as described in the literature review, but our empirical results suggest a more complex picture of TL; this highlights that the key behaviors of TL continue

to be extremely effective in fostering sustainable behaviors in this context. To summarize, these results complement the existing literature as they show that, despite being adapted to the empirical context, the mechanisms of TL are an effective catalyst for sustainability within an organization, thus supporting the theoretical expectations against empirical results.

6. Conclusions

The findings demonstrate that TL is a key driver of SB in the hotel industry in Jordan, operating through environmental training and awareness, ETA, MAS, and ASI. Although TL applies a strong direct effect, its indirect influence is more noticeable, with ETA emerging as the primary mechanism translating leadership into individual and organizational-level SB. This highlights the strategic importance of strengthening environmental awareness among employees in the hotel industry to foster sustainability-oriented organizational cultures.

Additionally, a particularly promising direction involves modeling TL as a higher-order construct comprising its four canonical dimensions [50], enabling the examination of differential effects, for instance, whether intellectual stimulation uniquely drives ASI, whether individualized consideration amplifies ETA, and whether inspirational motivation is the primary driver of MAS. Such dimension-level analysis would substantially enrich the theoretical contribution of this research stream.

The findings of the study, however, should be carefully observed in light of the methodological limitations, despite these contributions. Notwithstanding these contributions, methodological limitations must be considered when it comes to drawing conclusions from the findings. First, cross-sectional research design makes it impossible to speak to causality: All associations are measured at the same moment, and reverse causality and time-lagged processes are not excluded. Longitudinal designs would better quantify the developmental pathway leading to sustainable behavior after the exposure to transformational leadership with these designs and make stronger causal claims [56,57]. Data was collected from a single source at a single point in time, which may introduce common method bias despite the diagnostic evidence presented. Future studies should incorporate temporal separation between predictor and outcome measurement or employ multi-informant designs incorporating supervisor-rated behavioral outcomes, to provide stronger causal evidence.

Second, as the study was purposive, it included only the five-star hotels in four areas of Jordan (Amman, the Dead Sea, Petra, and Aqaba), which added representativeness constraints that need to be overcome in future studies. The emphasis on five-star properties, however, is justified in theory because of their built-in sustainability frameworks and the professional hierarchies of management; but there are three-star and four-star classes, which represent the majority of Jordan's accommodation supply, and they were not considered for the purposes of this form. Leadership-based sustainability relations in lower-classification properties can vary significantly because of limited resources, unstructured governance and different ownership or property arrangements. Consequently, the results of the present study cannot be extended to the entire group of Jordanian hotels. Likewise, the geographical focus on Jordan's main tourist routes collected the densest concentration of internationally branded hotels, but lost coverage of other, emerging regional destinations with hospitality-sector components the sustainability orientations and leadership cultures of which might have been significantly different from those described here. Future research could further expand the sample size by venue and location, allowing for cross-tier comparisons and greater coverage. Third, the narrow single-country focus can be used to gain cultural and contextual specificity, but this makes it difficult to extrapolate the findings to other Arab markets in the hospitality sector or to emerging economies with

different institutions and regulatory regimes. Further enhancing the generalizability of the proposed leadership-based sustainability mechanisms would be achieved by comparative, multi-country designs.

Overall, this research offers important empirical support for the hypotheses describing the relation between TL and sustainable behavior. However, a more detailed examination of the conceptual boundaries of our study shows that some aspects of the larger TL construct were not included in the study design and therefore broad generalizations about total and comprehensive TL coverage should be made with caution, because the dimensions not covered in our study were validated successfully without losing any item measures. The high and positive results achieved for these intact dimensions highlight the important principles of the framework that are very effective in practice. This research also found that implementing an entire transformational theory in an organization is not a prerequisite for achieving results, but rather, implementing a specific, powerful set of leadership dimensions highlighted in this research can be a practical and powerful blueprint for fostering sustainable practices in the industry.

Supplementary Materials: The following supporting information can be downloaded at: <https://www.mdpi.com/article/10.3390/su18146950/s1>.

Author Contributions: Conceptualization, M.A.; Methodology, M.A.; Software, M.A.; Validation, M.A.; Investigation, A.H.; Resources, A.H.; Data curation, A.H.; Writing—original draft, A.H.; Writing—review and editing, Y.K.; Visualization, Y.K.; Supervision, I.A.; Project administration, I.A.; Funding acquisition, Y.K. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: This study is waived for ethical review according to the ethical guidance at Al-Ahliyya Amman University; formal ethical approval is not strictly required, and the IRB has reviewed and acknowledged the ethical consideration of the research and confirmed its compliance with organizational standards.

Informed Consent Statement: Informed consent for participation was obtained from all subjects involved in the study.

Data Availability Statement: The raw data supporting the conclusions of this article will be made available by the authors on request.

Conflicts of Interest: The authors declare no conflicts of interest.

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