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FOSTERING SUSTAINABLE WORK BEHAVIOR IN HOTEL AND TOURISM ENTERPRISES: UNPACKING THE ROLES OF ADAPTIVE LEADERSHIP, RESILIENCE, AND GREEN SELF-EFFICACY

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Abstract: This study examines the impact of adaptive leadership on sustainable work behavior among employees in Egypt's hotel and tourism sector, drawing on Conservation of Resources (COR) theory. The study aims to explain how leadership-driven resource-building mechanisms enhance employees' environmentally sustainable behaviors in tourism service-oriented context. Data were collected from 430 employees working in five-star hotels and category-A travel agencies in Egypt. The proposed research model was tested using Partial Least Squares Structural Equation Modeling (PLS-SEM) with WarpPLS software. The results indicate that adaptive leadership has a significant positive effect on sustainable work behavior. Psychological resilience was found to mediate this relationship, suggesting that adaptive leaders help employees develop valuable personal resources that support sustained environmental actions. Furthermore, green self-efficacy moderates the relationship between psychological resilience and sustainable work behavior, such that the relationship is stronger for employees with higher green self-efficacy. These findings highlight the critical role of adaptive leadership in fostering resource-building processes that promote sustainability. Practical implications for leadership development and employee support are discussed, along with recommendations for future research.

Keywords: Adaptive Leadership, Sustainable Work Behavior, Psychological Resilience, Green Self-Efficacy, Hotel and Tourism Enterprises

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INTRODUCTION

In today's rapidly evolving organizational landscape, accelerated technological advances, environmental challenges, and shifting societal expectations have placed unprecedented stress on both leaders and employees (Nöthel et al., 2023; Salama et al., 2025). As a result, organizations are increasingly judged not only on financial returns but also on their commitment to environmental and social sustainability, which are expected to be aligned and mutually reinforcing (Chughtai et al., 2024; Alshehri et al., 2024). These transformative demands call for leadership approaches that move beyond traditional traits to effectively guide sustainable behaviors within organizations (Alhemimah et al., 2024; Batarfi et al., 2025).

Adaptive leadership, as conceptualized by Northouse (2025), is recognized as a multifaceted construct encompassing situational awareness, relational authenticity, and systemic thinking. This leadership style balances strategic flexibility with emotional intelligence, enabling leaders to navigate complex sustainability challenges (Acquadro Maran et al., 2023). Adaptive leaders foster shared corporate visioning and empower employees to contribute creatively toward solving environmental and organizational problems (Latifah, 2024). Such leadership thus acts as a transformative force essential for sustaining organizational sustainability efforts. Sustainable work behaviors—including eco-initiatives, civic engagement, and eco-helping—are critical components of environmental proactivity in organizations (Kim et al., 2019; Paillé et al., 2022). Existing research highlights the interplay of cognitive and affective factors, such as environmental awareness, moral obligation, and organizational commitment, in maintaining employees' environmentally responsible behaviors over the long term (Sulphey et al., 2024). Psychological resilience, widely recognized as a multidimensional construct, encompasses cognition, optimism, adaptability, and resourcefulness, enabling employees to manage stress and recover effectively from adversity (Lengnick-Hall et al., 2011; Raetze et al., 2021; Khairy et al., 2025). Resilient employees are better equipped to sustain high performance in dynamic environments and contribute to organizational well-being during

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crises (Alitabar & Parsakia, 2025). Green self-efficacy, which comprises cognitive, motivational, and behavioral components, plays a vital role in translating employees' environmental beliefs into sustainable actions (Ahmad et al., 2021; Zhang et al., 2024a; Salama et al., 2025). Knowledge of environmental issues, personal motivation, and proactive engagement collectively influence the degree to which employees internalize and act on sustainability values (Pasquariello et al., 2023).

Despite the theoretical promise of adaptive leadership in fostering sustainability, empirical research directly linking adaptive leadership to sustainable work behavior remains scarce (Khairy & Badwy, 2026). Moreover, psychological mechanisms explaining how adaptive leadership influences such behaviors have been largely overlooked.

In particular, the potential mediating role of psychological resilience in this relationship is underexplored. To address these gaps, the aim of this study is to examine the effect of adaptive leadership on employees' sustainable work behavior in Egypt's hotel and tourism sector, drawing on Conservation of Resources (COR) theory. Specifically, the study investigates the mediating role of psychological resilience in this relationship and the moderating role of green self-efficacy in strengthening the link between psychological resilience and sustainable work behavior. By doing so, this research seeks to contribute to a deeper understanding of the psychological processes through which leadership can promote sustainability in dynamic and service-oriented contexts. Table (1) below presents a summary of the key construct used in the study.

Table 1. Summary of key constructs and their roles in the study Source: authors own work

Construct	Definition	Role in Study
Adaptive Leadership	A leadership approach emphasizing flexibility, collaboration, and systemic thinking to navigate complex, dynamic challenges (Northouse, 2025).	Independent variable influencing sustainable work behavior and psychological resilience.
Sustainable Work Behavior	Employee actions supporting environmental, social, and organizational sustainability, including eco-initiatives and civic engagement (Kim et al., 2019; Paillé et al., 2022).	Dependent variable reflecting environmentally responsible behaviors in the workplace.
Psychological Resilience	The capacity to manage stress, adapt, and recover from adversity in the workplace (Raetze et al., 2021; Alitabar & Parsakia, 2025).	Mediator explaining how adaptive leadership influences sustainable work behavior.
Green Self-Efficacy	Belief in one's ability to engage effectively in pro-environmental behaviors, encompassing cognitive, motivational, and behavioral dimensions (Ahmad et al., 2021; Zhang et al., 2024a).	Moderator strengthening the relationship between psychological resilience and sustainable work behavior.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

1. Underpinning theory

Conservation of Resources (COR) Theory, proposed by Hobfoll (1989), posits that individuals strive to acquire, retain, and protect resources they deem valuable for their survival and goal attainment. When these resources—such as energy, time, social support, or self-efficacy—are threatened or depleted, individuals experience stress, which can undermine their motivation and negatively affect work-related outcomes (Hobfoll et al., 2018). In organizational settings, COR theory offers a useful lens for understanding how employees draw upon psychological and social resources to navigate change and maintain constructive behaviors (Halbesleben et al., 2014). Recent extensions of the theory into leadership and sustainability domains suggest that resource-gain cycles—where individuals accumulate and reinforce resources over time—play a crucial role in building resilience and encouraging environmentally responsible behavior (Chen & Lin, 2018; Hobfoll et al., 2018). Therefore, COR theory provides a strong theoretical foundation for explaining how adaptive leadership can enhance employees' psychological resilience and, through effective resource management, support sustainable work behavior.

2. Hypotheses development

2.1. Adaptive Leadership and Sustainable Work Behavior

Adaptive leadership is characterized as an approach that emphasizes flexibility and collaboration while guiding employees through uncertainty and change. This style enables organizations to navigate dynamic environments by fostering innovation and encouraging employees to develop solutions to complex challenges (Heifetz et al., 2009; Uhl-Bien & Arena, 2018). Adaptive leaders also empower organizations by leveraging collective intelligence to promote shared accountability and continuous learning, thereby enhancing institutional adaptability (Thommes et al., 2024). Northouse (2025) further refine this concept by presenting adaptive leadership as a multidimensional construct rooted in situational awareness, relational transparency, and systemic thinking. Adaptive leaders integrate strategic flexibility with emotional intelligence, equipping them to effectively address complex sustainability challenges (Rico et al., 2019).

Moreover, they cultivate shared meaning by involving employees in shaping their work environment and collaboratively addressing organizational issues (Latifah, 2024; Kuluski et al., 2021). These characteristics underscore the transformative potential of adaptive leadership in advancing sustainable development across organizational contexts (Cletzer et al., 2021; Sott et al., 2025). Sustainable work behavior refers to employees' active engagement in actions supporting environmental, social, and organizational sustainability within the workplace (Barrera-Verdugo, 2025). It encompasses resource conservation, environmental responsibility, and a long-term orientation toward work behavior, all contributing to broader corporate sustainability goals (Norton et al., 2015; Zientara & Zamojska, 2018). Sustainable work behavior includes dimensions such as eco-initiatives, eco-civic engagement, and eco-helping behaviors that collectively promote environmental stewardship (Kim et al., 2019; Paillé & Valéau, 2022). Recent research highlights the cognitive and affective foundations of these behaviors, emphasizing the interplay of environmental awareness, moral obligation, and

organizational commitment in sustaining responsible actions (Sulphey et al., 2024). By empowering employees to think critically and creatively, adaptive leadership enhances engagement in these environmentally responsible practices aligned with long-term sustainability goals. Research shows that adaptive leaders cultivate responsibility, accountability, and proactive problem-solving within their teams (Harms et al., 2018; Yukl & Mahsud, 2010). Such environments nurture sustainable work behaviors as employees integrate sustainability into their daily practices. Consequently, organizations led by adaptive leaders are better positioned to meet their sustainability objectives. This leads to the hypothesis:

H1: Adaptive leadership is positively related to sustainable work behavior.

2.2. Adaptive Leadership and Psychological Resilience

Psychological resilience is an individual's capacity to absorb stress, overcome hardship, and adapt to organizational change while maintaining effective functioning and performance (Acquadro Maran et al., 2023; Khairy et al., 2025). It represents a vital personal resource enabling employees to cope with workplace demands and sustain positive behaviors under pressure (Fletcher & Sarkar, 2013; Luthans et al., 2015). Resilience nurtures optimism, adaptability, and perseverance—qualities essential for thriving amid dynamic and uncertain work environments (Doran et al., 2017). Contemporary perspectives view resilience as multidimensional, encompassing emotional regulation, optimism, adaptability, and resourcefulness (Raetze et al., 2021; Lengnick-Hall et al., 2011). These dimensions empower employees to navigate stressors, recover from setbacks, and maintain high performance during change. Beyond individual well-being, resilient employees enhance organizational adaptability and sustainable functioning during crises (Alitabar & Parsakia, 2025).

Adaptive leadership directly fosters resilience by cultivating environments that encourage open communication, support facing challenges, and development of adaptive coping strategies. This leadership serves as a protective mechanism that buffers employees from negative impacts caused by resource loss and organizational strain. According to Conservation of Resources (COR) Theory, leaders who replenish employee resources—such as emotional support, autonomy, and clarity—help prevent resource depletion and strengthen internal reserves (Hobfoll et al., 2018). By guiding employees through uncertainty and equipping them to adapt, adaptive leaders contribute to psychological resilience development, enabling employees to remain effective and engaged amid ongoing challenges. Consequently, the following hypothesis is formulated:

H2: Adaptive leadership is positively related to psychological resilience.

2.3. Psychological Resilience and Sustainable Work Behavior

Resilience equips employees to endure stressors, adapt effectively, and maintain functionality at work. Resilient individuals tend to be more positive, motivated, and capable of sustaining constructive behaviors under adversity (Fletcher & Sarkar, 2013). These qualities are crucial for fostering sustainability in organizational practices, promoting persistence, engagement, and consistency over time. Empirical evidence suggests that resilient employees engage more in sustainable behaviors due to their optimistic outlook, focus, and proactive problem-solving (Robertson et al., 2015). Thus, resilience functions not only as a coping mechanism but as a catalyst for sustainability outcomes. Recent empirical research emphasizes that resilience functions as a key psychological resource, supporting organizational adaptability and enhancing long-term employee performance. Resilient employees are better able to maintain motivation and consistent performance in high-pressure environments, which contributes to sustainable workplace outcomes (Atan & Gelirli, 2025). Further studies on resilience in work contexts indicate that it not only benefits individual performance but also promotes sustainable organizational and community outcomes, highlighting a conceptual positive relationship between psychological resilience and sustainable work behavior (Fergusson et al., 2020). Additionally, research exploring the interaction between employee resilience, sustainable human resource management, and work engagement suggests that resilience plays a pivotal role in fostering sustainable work outcomes. Enhanced engagement, supported by resilience, is an important driver of sustainable work behavior (Trunk Širca et al., 2024). Based on this evidence, the following hypothesis is proposed:

H3: Psychological resilience is positively related to sustainable work behavior.

2.4. The Mediating Role of Psychological Resilience

Adaptive leadership may influence sustainable work behavior indirectly by enhancing employees' psychological resilience. Leaders employing adaptive strategies provide supportive resources—such as autonomy, feedback, and emotional support—that bolster coping capacities and enable employees to recover more effectively from setbacks. These resources act as psychological capital that sustains positive work behaviors over time (Chen & Lin, 2018). From the COR Theory perspective, resilience serves as a mediating mechanism channeling leadership support into constructive employee outcomes. By fostering resilience, adaptive leadership equips employees to manage stress and maintain consistent performance under uncertainty or pressure. Empirical evidence suggests that psychological resilience partially mediates the relationship between positive leadership styles—such as transformational or servant leadership—and employee outcomes, including reduced burnout. This indicates that resilience helps explain how leadership affects employee behavior (Onan et al., 2025). Additionally, research has shown that inclusive leadership positively influences employees' psychological resilience, which in turn is linked to improved performance and better coping strategies at work. These findings support the notion that leadership impacts employee outcomes through resilience mechanisms (Xintian & Peng, 2023). Organizational studies further suggest that leadership behaviors, including strengths-based and servant leadership, play a crucial role in developing employee resilience, which subsequently enhances work engagement and adaptive performance (Breevaart & van Woerkom, 2024). Based on these insights, the following hypothesis is proposed:

H4: Psychological resilience mediates the relationship between adaptive leadership and sustainable work behavior.

2.5. The Moderating Role of Green Self-Efficacy

Green self-efficacy refers to employees' belief in their capability to successfully perform tasks related to environmental sustainability (Wang et al., 2018). Individuals with high green self-efficacy are more confident in engaging in pro-environmental practices and translating intentions into meaningful sustainability actions (Chen et al., 2020; Li et al., 2021). Moreover, strong green self-efficacy motivates employees to proactively initiate eco-friendly behaviors, thereby contributing productively to organizational sustainability goals (Elavarasan et al., 2022). Green self-efficacy consists of three interrelated dimensions: cognitive (environmental knowledge and awareness), motivational (personal concern and drive for the environment), and behavioral (proactive engagement in green practices). Together, these influence the extent to which employees convert environmental beliefs into tangible sustainability actions. Employees with high green self-efficacy are more likely to channel their resilience toward sustainability challenges, strengthening the positive effect of resilience on sustainable work behavior. Conversely, those with low green self-efficacy may find it difficult to translate resilience into sustainable practices, even with leadership support. This dynamic underscores the moderating boundary role of green self-efficacy. Research in hospitality contexts has shown that environmental self-efficacy can enhance the impact of eco-centric leadership on employees' organizational citizenship behavior for the environment (OCBE). Specifically, employees with higher self-efficacy tend to demonstrate stronger pro-environmental behaviors, suggesting that self-efficacy amplifies sustainability-related effects (Abdou, 2025). Similarly, Pasquariello et al. (2025) reported that green self-efficacy is a significant predictor of pro-environmental behavior, with individuals possessing higher green self-efficacy showing greater engagement in environmentally responsible actions. These findings support theoretical expectations regarding the moderating role of self-efficacy in sustainability-related outcomes. Consequently, the following hypothesis is formulated:

H5: Green self-efficacy moderates the relationship between psychological resilience and sustainable work behavior, such that the positive relationship is stronger when green self-efficacy is high.

The theoretical framework of the study is illustrated below in Figure 1.

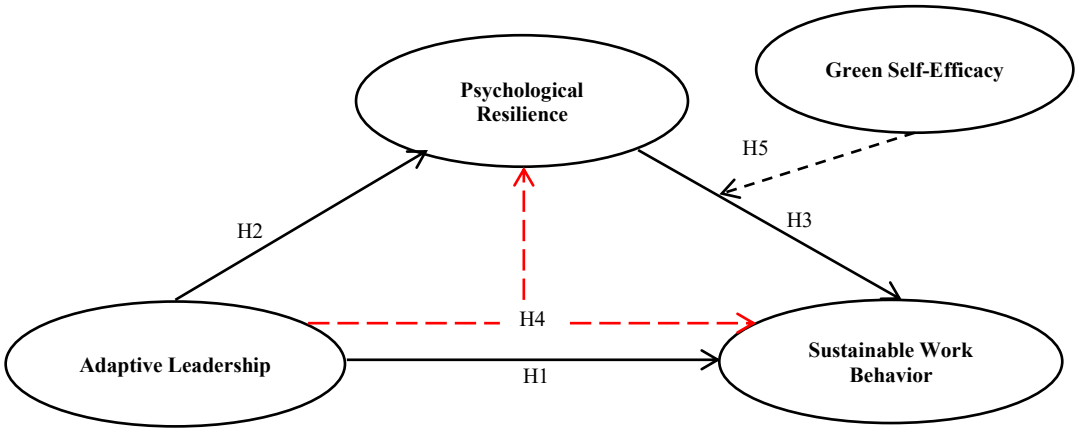

Figure 1. The theoretical framework of the study (Source: authors own work)

RESEARCH METHODOLOGY

1. Measuring instruments

Adaptive leadership was assessed using a 15-item instrument developed by Nöthel et al. (2023). Sustainable work behavior was evaluated through a 7-item scale created by Temminck et al. (2015). To measure green self-efficacy, a 6-item scale from the works of Chen et al. (2001) and Chen et al. (2015) was employed. Additionally, employees' psychological resilience (EPR) was gauged using six items derived from Smith et al. (2008). The full list of survey items can be found in Appendix A. To establish content validity, the questionnaire underwent a pilot test involving 30 participants, including 5 academic experts, 5 industry professionals, and 20 employees. Their feedback helped improve the clarity and relevance of the questions, although the core content of the items remained unchanged. Responses were collected using a 5-point Likert scale, where 1 indicated 'Strongly disagree' and 5 indicated 'Strongly agree.' This response format was selected due to its straightforwardness and consistency with previous studies examining psychological and environmentally related behaviors in organizational settings.

2. Sampling and Data Collection

This research targeted employees working in five-star hotels and category-A travel agencies within Egypt, sectors that have notably embraced green initiatives to enhance sustainability (Alsheref et al., 2024; Al-Romeedy et al., 2025). Focusing on the Greater Cairo Region was both a strategic and contextually relevant choice, as this area is recognized as one of Egypt's leading international tourism centers. It features a high density of tourism and hospitality businesses that operate in a competitive environment sensitive to environmental concerns. These organizations are increasingly pressured to comply with global sustainability standards while maintaining high-quality service delivery. They often invest in leadership development, employee engagement programs, and eco-friendly practices, making them ideal settings for examining the study's conceptual framework, which investigates the impact of paradoxical leadership on environmentally innovative work behaviors. Additionally, the well-structured human resource systems and the culturally diverse workforce in this region provide a valuable context for exploring the roles of mediators and moderators such as employee green

commitment and green self-efficacy. The economic dependence on tourism alongside the emphasis on environmental stewardship further highlights the importance of understanding sustainable employee behavior within this locale.

Data collection was conducted using structured questionnaires, initially coordinated through the HR departments of the selected organizations. After securing approval from management, surveys were distributed directly to employees on-site. Participation was entirely voluntary, and strict confidentiality protocols were followed. According to 2022 data from the Egyptian Ministry of Tourism and Antiquities, Greater Cairo hosts 1,666 category-A travel agencies and 30 five-star hotels. The survey period spanned August to September 2025, targeting employees from 22 five-star hotels and 65 category-A travel agencies. Organizations were selected through judgmental sampling, while employee participants were recruited via convenience sampling based on willingness to engage. Surveys were administered following verbal consent from management, and participants were informed that completing the questionnaire implied their informed consent. Anonymity and adherence to ethical standards were maintained throughout. Ultimately, 430 valid responses were collected, exceeding the minimum sample size of 340 recommended by Hair et al. (2010), who suggest a ratio of at least 10 participants per estimated parameter. This sample size provided adequate power for the planned statistical analyses.

3. Data Analysis

To examine the study's hypotheses and test the proposed conceptual framework, Partial Least Squares Structural Equation Modeling (PLS-SEM) was conducted using WarpPLS software. WarpPLS is specialized software for PLS-SEM. It is known for its user-friendly interface and its ability to model complex, nonlinear relationships, making it popular in social sciences for testing hypotheses in fields like marketing, psychology, and management. WarpPLS offers both classic and factor-based algorithms, supports formative and reflective variables, calculates various quality indices, and provides tools for moderation, mediation, and common method bias assessment, including full collinearity evaluation (Kock, 2021). In addition, PLS-SEM is particularly advantageous for research focused on predicting relationships among variables, especially in contexts where theory is still being developed rather than solely tested. This method is well-suited for analyzing complex models, managing small to medium sample sizes, and requiring fewer assumptions about data distribution compared to covariance-based SEM approaches. The analysis followed the recommended two-stage process, evaluating both the measurement model (outer model) and the structural model (inner model) as outlined by Hair et al. (2019). This procedure allowed for the validation of the constructs as well as the examination of direct effects, mediation, and moderation, thereby offering a thorough insight into the relationships among adaptive leadership, psychological resilience, green self-efficacy, and sustainable work behavior. Model fit was assessed using indices generated by WarpPLS, including the Standardized Root Mean Square Residual (SRMR) and the Tenenhaus Goodness-of-Fit (GoF). The SRMR value was below the widely accepted cutoff of 0.08, suggesting an adequate fit between the model and the observed data. Additionally, the GoF score surpassed the threshold of 0.36, indicating a strong explanatory capability of the model.

RESULTS

1. Participants' profile

Table 2 outlines the demographic characteristics of the 430 participants included in the study. The sample was predominantly male, comprising 70.23% of respondents, while females accounted for 29.77%. In terms of age distribution, the largest group fell within the 30–45 years age range (44.42%), followed by participants under 30 years old (30%) and those over 45 years (25.58%). Regarding educational attainment, the majority of respondents held a bachelor's degree (73.95%), while 15.81% had completed high school, and 10.23% possessed a master's or doctoral degree. In terms of employment sector, most participants were employed in the hotel industry (60.47%), with the remaining 39.53% working in travel agencies.

Table 2. Participant's profile (N=430)

		Frequency	Percent
Gender	Male	302	70.23
	Female	128	29.77
Age	18:< 30 years	129	30.00
	30 : 45 years	191	44.42
	>45	110	25.58
Education	High schools	68	15.81
	Bachelor	318	73.95
	Master/PhD	44	10.23
Workplace	Hotels	260	60.47
	Travel agencies	170	39.53
Notably, only individuals with a minimum of one year of work experience were included in the study to ensure reliable and informed responses, aligning with prior research of Morrison (1993) suggesting that employees typically become familiar with organizational culture within their first six months.			

2. Measurement model

According to Kock (2021) criteria, appendix (B) outlines various model fit and quality indices used to assess the robustness of the structural model. All indicators met or exceeded the recommended thresholds, suggesting a strong and well-fitting model. Specifically, the average path coefficient (APC), average R-squared (ARS), and adjusted R-squared (AARS) all demonstrated statistical significance ($P < 0.001$), confirming the model's explanatory power. Multicollinearity levels were

within acceptable limits, as indicated by AVIF and AFVIF values below 3.3. Additionally, the Tenenhaus GoF value of 0.669 reflects a large overall model fit. The SPR, RSCR, SSR, and NLBCDR all achieved perfect scores of 1.000, surpassing their respective minimum criteria. These results collectively support the model's validity, reliability, and predictive relevance.

Table 3 presents the psychometric assessment of the key constructs used in the study: adaptive leadership (AL), sustainable work behavior (SWB), psychological resilience (PR), and green self-efficacy (GSE). Each construct demonstrates strong internal consistency and validity. Composite reliability (CR) values range from 0.910 to 0.958, exceeding the recommended threshold of 0.7, indicating high reliability. Similarly, Cronbach's alpha (CA) values, all above 0.70, confirm internal consistency among the items. The average variance extracted (AVE) values for all constructs surpass the 0.50 benchmark, supporting convergent validity. Indicator loadings mostly exceed 0.70, with a few slightly lower, yet still acceptable. Multicollinearity is not a concern, as VIF values for all constructs remain below the critical limit of below 3.3. Overall, these results confirm that the measurement model is both reliable and valid for further structural analysis.

Table 4 displays the correlations among the latent variables— adaptive leadership (AL), sustainable work behavior (SWB), psychological resilience (PR), and green self-efficacy (GSE)—along with the square roots of the AVE values, shown diagonally in bold. The square root of each construct's AVE exceeds its correlations with other constructs, indicating satisfactory discriminant validity based on the Fornell-Larcker criterion.

Table 3. Results of psychometric properties

Construct	Indicators	Loading	CR	CA	AVE	VIF
Adaptive Leadership (AL)	AL.1	(0.666)	0.958	0.952	0.607	3.290
	AL.2	(0.753)				
	AL.3	(0.883)				
	AL.4	(0.797)				
	AL.5	(0.860)				
	AL.6	(0.691)				
	AL.7	(0.761)				
	AL.8	(0.713)				
	AL.9	(0.675)				
	AL.10	(0.883)				
	AL.11	(0.712)				
	AL.12	(0.856)				
	AL.13	(0.864)				
	AL.14	(0.874)				
	AL.15	(0.623)				
Sustainable Work Behavior (SWB)	SWB.1	(0.792)	0.912	0.887	0.600	2.519
	SWB.2	(0.855)				
	SWB.3	(0.805)				
	SWB.4	(0.839)				
	SWB.5	(0.797)				
	SWB.6	(0.643)				
	SWB.7	(0.667)				
Psychological Resilience (PR)	PR.1	(0.734)	0.911	0.881	0.631	3.077
	PR.2	(0.815)				
	PR.3	(0.836)				
	PR.4	(0.689)				
	PR.5	(0.821)				
	PR.6	(0.859)				
Green Self-Efficacy (GSE)	GSE.1	(0.854)	0.910	0.881	0.628	1.850
	GSE.2	(0.763)				
	GSE.3	(0.820)				
	GSE.4	(0.715)				
	GSE.5	(0.800)				
	GSE.6	(0.795)				

Table 4. Correlations among latent variables with the square root of AVEs

Construct	AL	SWB	PR	GSE
Adaptive Leadership (AL)	**0.779**			
Sustainable Work Behavior (SWB)	0.722	**0.775**		
Psychological Resilience (PR)	0.733	0.732	**0.794**	
Green Self-Efficacy (GSE)	0.625	0.543	0.563	**0.792**

Table 5 reports the results of the discriminant validity assessment using the Heterotrait-Monotrait (HTMT) ratio. All HTMT values fall below the conservative threshold of 0.85, indicating that each construct is empirically distinct from the others. These results provide strong evidence of discriminant validity, suggesting that the constructs in the model do not suffer from conceptual overlap or measurement redundancy. Accordingly, the measurement model is deemed robust and suitable for further structural analysis.

Table 5. Discriminant validity (HTMT)

Construct	AL	SWB	PR	GSE
Adaptive Leadership (AL)				
Sustainable Work Behavior (SWB)	0.806			
Psychological Resilience (PR)	0.844	0.835		
Green Self-Efficacy (GSE)	0.690	0.625	0.641	

3. Multi-group analysis

Table 6 presents the results of the multigroup analysis comparing path relationships between employees in five-star hotels and those in travel agencies. The analysis evaluates whether the structural relationships differ significantly across the two groups. Although slight differences in path coefficients are observed—such as AL → SWB (0.325 vs. 0.346) and PR*GSE → SWB (0.156 vs. 0.219)—none of the differences are statistically significant, as all p-values exceed the 0.05 threshold. Consequently, no effects based on workplace type are supported. These findings suggest that the structural relationships among the variables are consistent across both types of enterprises.

Table 6. Multigroup analysis results

Relationship	Path coeff. (Five-Star Hotel)	Path coef. (Travel Agency)	Absolute path coeff. Diff.	p-value (one-tailed)	Decision
AL →SWB	0.325	0.346	0.021	0.413	Not Supported
AL →PR	0.821	0.787	0.033	0.352	Not Supported
PR →SWB	0.420	0.449	0.030	0.377	Not Supported
PR*GSE → SWB	0.156	0.219	0.063	0.263	Not Supported

4. Structural model and hypotheses testing

Table 7 and Figure 2 summarize the results of both direct and moderating effects within the structural model. All proposed hypotheses are supported, as indicated by statistically significant path coefficients ($p < 0.01$). Specifically, adaptive leadership (AL) has a positive influence on both sustainable work behavior (SWB) ($\beta = 0.34$) and psychological resilience (PR) ($\beta = 0.81$), with medium to large effect sizes ($f^2 = 0.253$ and 0.651, respectively). Additionally, PR positively impacts SWB ($\beta = 0.45$, $f^2 = 0.342$), reinforcing its role. The moderation analysis also shows that green self-efficacy (GSE) significantly strengthens the relationship between PR and SWB ($\beta = 0.13$, $f^2 = 0.046$), although with a small effect size.

Table 7. Direct and moderation effects

H	Structural Paths	Path Coefficient (β)	*P*-values	Effect Size (f^2)	Result
Direct Effect					
H1	AL →SWB	0.34	<0.01	0.253	Supported
H2	AL →PR	0.81	<0.01	0.651	Supported
H3	PR →SWB	0.45	<0.01	0.342	Supported
Moderating Effect PR $R^{2:} = 0.65$, SWB $R^{2:} = 0.64$					
H5	PR*GSE → SWB	0.13	<0.01	0.046	Supported

Effect sizes were interpreted using Cohen's (1988) guidelines. The R^2 values indicate strong explanatory power for both PR ($R^2 = 0.65$) and SWB ($R^2 = 0.64$), suggesting that the model effectively accounts for the variance in these outcomes.

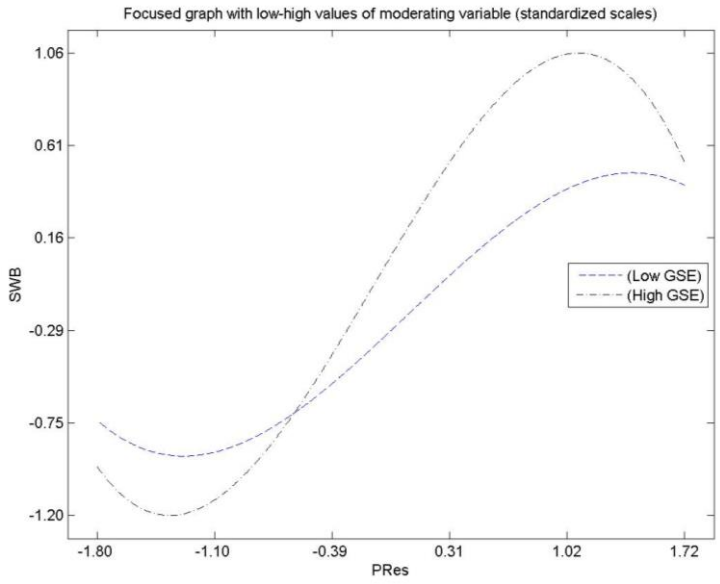

Figure 2. Moderating effect of GSE

Table 8 presents the results of the mediation analysis using bootstrapped confidence intervals approach suggested by Preacher & Hayes (2008). The analysis tests whether psychological resilience (PR) mediates the relationship between adaptive leadership (AL) and sustainable work behavior (SWB). The indirect effect (path a × path b) is statistically significant (β = 0.365, t = 11.06, SE = 0.033), with the 95% bootstrapped confidence interval ranging from 0.300 to 0.429—excluding zero, which confirms the presence of mediation. Thus, Hypothesis H4 is supported, indicating that PR plays a significant partial mediating role in the effect of AL on SWB.

Table 8. Mediation analysis' Bootstrapped Confidence Interval

Hypo.		Path a	Path b	Indirect Effect	SE	t-value	Bootstrapped Confidence Interval		Mediation
							95% LL	95% UL	
H4	AL→PR→SWB	0.810	0.450	0.365	0.033	11.06	0.300	0.429	Partial

DISCUSSION

The results of this study highlight the crucial role of adaptive leadership in driving sustainable work behavior among employees in the hotel and tourism industry, particularly through the mediating effect of psychological resilience and the moderating role of green self-efficacy. These findings offer strong empirical support for the proposed conceptual framework and contribute to a more nuanced understanding of how leadership and individual psychological factors interact to influence pro-environmental behavior in service-oriented contexts.

First, the positive relationship between adaptive leadership and sustainable work behavior (H1- supported) aligns with other research indicating that adaptive, inclusive, flexible, and empowering leadership styles are instrumental in encouraging environmentally responsible practices (e.g, Al-Romeedy et al., 2025, Khairy & Badwy, 2026).

Kim et al. (2017) found that empowering leadership fosters green creativity and innovation, while Robertson & Barling (2013) emphasized that transformational leadership can shape employees' values and motivation toward environmental responsibility.

Adaptive leadership, with its focus on responsiveness and collaborative problem-solving (Uhl-Bien & Arena, 2018), appears particularly suited for navigating the complexity of sustainability goals in dynamic service environments.

Second, the link between adaptive leadership and psychological resilience (H2-supported) reinforces earlier studies showing that supportive leadership enhances employees' psychological resources (e.g. Khairy & Badwy, 2026).

Leadership behaviors that demonstrate care, provide clarity, and encourage learning foster employee resilience (Luthans et al., 2006; Harland et al., 2005; Zhang et al., 2024b).

In high-pressure service sectors like tourism, this resilience enables employees to cope with frequent change, emotional labor, and customer demands—making adaptive leadership a protective and empowering force.

The finding that psychological resilience positively predicts sustainable work behavior (H3-supported) is consistent with previous literature that positions resilience as a facilitator of constructive, long-term behavior under stress (Khairy & Badwy, 2026). Atan & Gelirli (2025) and Elshaer et al. (2024) found that resilient employees tend to be more engaged and persistent, characteristics that directly support sustainable actions.

Similarly, resilient individuals often display proactive attitudes and greater personal initiative, both of which are crucial for maintaining environmentally sustainable practices in the workplace.

Significantly, the study confirms the mediating role of psychological resilience in the relationship between adaptive leadership and sustainable work behavior (H4-supported), offering empirical backing to theoretical claims that resilience serves as a resource mechanism (Hobfoll et al., 2018).

This supports findings by Zhang et al. (2023) and Wang (2024), who argue that psychological capital functions as a pathway through which leadership exerts influence on positive behavioral outcomes. In the hospitality industry, where external stressors such as customer complaints, seasonal fluctuations, and performance pressure are common, this resilience becomes a critical bridge between leadership support and consistent sustainable behavior.

The moderating role of green self-efficacy (H5- supported) further enriches our understanding of employee behavior by demonstrating that even with high levels of resilience, employees must believe in their ability to contribute to environmental goals in order to act. This finding echoes Bandura's (1997) social cognitive theory, which emphasizes that self-efficacy beliefs influence whether individuals translate intention into behavior. Studies by Mughal et al. (2022) and Ullah et al. (2021) similarly showed that employees with high environmental self-efficacy are more likely to engage in green behaviors, especially when empowered or supported by organizational factors.

CONCLUSIONS

Theoretical Implications

This study offers several theoretical contributions to the fields of leadership, organizational behavior, and sustainability.

First, it extends the theoretical application of adaptive leadership (Uhl-Bien & Arena, 2018) into the domain of environmental sustainability. While most leadership research in sustainability has focused on transformational or ethical leadership (Robertson & Barling, 2013; Hossari & Elfahli, 2022), this study positions adaptive leadership as a practical and contextually relevant leadership style for industries characterized by change, uncertainty, and environmental complexity—like tourism and hospitality. The findings demonstrate that adaptive leadership can go beyond operational guidance to shape employees' environmental attitudes and actions.

Second, by empirically validating psychological resilience as a mediator, the study contributes to a deeper understanding of the Conservation of Resources (COR) theory (Hobfoll et al., 2018) in action. Leadership not only directly influences behavior but also enhances the psychological resources employees draw upon to navigate challenges and maintain performance. This extends the work of Luthans et al. (2006) on psychological capital by highlighting resilience as an active conduit between leadership inputs and sustainability outputs. In doing so, the study reinforces the argument that psychological resilience is not merely a passive buffer, but a dynamic enabler of behavior.

Third, introducing green self-efficacy as a moderator adds an important boundary condition to the leadership–behavior relationship. The findings affirm Bandura's (1997) assertion that efficacy beliefs are critical to behavioral activation, especially in voluntary domains like environmental behavior. While previous studies (e.g. Pasquariello et al., 2025; Lili & Rafiq, 2025) have identified self-efficacy as a predictor of green behavior, this study uniquely demonstrates its role in amplifying the effect of resilience—suggesting that personal confidence in one's environmental impact is essential for converting psychological resources into visible action.

Lastly, by applying and testing this model in the context of Egypt's hospitality and tourism industry, the research answers calls for contextualized theory development in non-Western and service-oriented settings (Hofstede, 2001; Wickert et al., 2024). It offers a model that accounts for organizational realities such as cultural diversity, performance pressures, and environmental accountability—characteristics common to tourism enterprises worldwide but underrepresented in mainstream organizational research.

Practical implications

This study provides several practical recommendations for managers and leaders in the hotel and tourism industry. Promoting adaptive leadership is a key strategy for encouraging sustainable work behavior among employees. Organizations can achieve this by implementing leadership programs that develop flexibility, emotional intelligence, collaborative decision-making, and responsiveness to change. Leaders should be equipped to involve employees in open discussions, engage teams in addressing environmental challenges, and model sustainable practices. Supporting leaders in experimenting with innovative, eco-friendly initiatives can further strengthen a culture of accountability and sustainability.

In addition, supporting employees' psychological resilience is equally important for fostering consistent environmentally responsible behaviors. Organizations can integrate resilience-enhancing activities into wellness programs, such as stress management sessions, cognitive reframing exercises, and growth mindset training. Peer support networks and mentorship opportunities can provide additional coping resources, while recognition and rewards for resilient behaviors reinforce the value of overcoming challenges to maintain sustainable practices.

Moreover, enhancing employees' green self-efficacy also plays a critical role in sustaining environmentally friendly behaviors. Practical training on eco-friendly activities, including energy-saving measures, waste management, and sustainable customer service practices, can boost employees' confidence in their ability to contribute.

Establishing clear goals, providing regular feedback, and acknowledging employees' green initiatives further reinforce these behaviors. Integrating green self-efficacy into performance assessments and team objectives can help embed sustainability into organizational priorities. Lastly, hotel and tourism enterprises should take steps to embed sustainability into their daily operations and organizational culture.

This includes incorporating environmental responsibilities into job descriptions, aligning sustainability goals with departmental key performance indicators (KPIs), and using internal communication tools to promote awareness.

Adaptive leaders can play a key role during change initiatives by preparing teams for transitions, communicating purpose clearly, and encouraging experimentation with new, eco-friendly practices. By implementing these strategies, organizations not only promote sustainable behavior but also build a more resilient, engaged, and future-ready workforce.

Limitations and Directions for Future Research

While this study offers valuable insights into the role of adaptive leadership in promoting sustainable work behavior within Egypt's hotel and tourism sector, some limitations should be acknowledged, which also open pathways for future research. The study utilized a cross-sectional design, which restricts the ability to draw firm conclusions about causality among the examined variables. Although theoretical reasoning supports the direction of relationships, longitudinal or experimental designs are recommended for future research to capture how adaptive leadership, psychological resilience, and green self-efficacy evolve over time and influence sustainability-related outcomes.

In addition, the research was confined to employees working in five-star hotels and category-A travel agencies in Egypt, which may limit the generalizability of the results. The influence of adaptive leadership and psychological traits may differ across cultural, organizational, or economic contexts. Future studies are encouraged to replicate this model in different countries, regions, and service-level segments to test its cross-contextual applicability.

Moreover, this study focused specifically on psychological resilience as a mediator and green self-efficacy as a moderator. Future research could expand the model by examining other psychological or contextual variables, such as environmental passion, organizational green climate, or perceived organizational support, to provide a more comprehensive understanding of what drives sustainable behavior in service settings.

Finally, the incorporation of qualitative or mixed-methods approaches would offer deeper insights into how employees perceive adaptive leadership and how it shapes their environmental attitudes and behaviors in daily work practices. Such methods could uncover underlying mechanisms that quantitative models may not fully capture.

Appendix (A) measurement scales		
Adaptive leadership (AL) Nöthel et al. (2023)	AL1	My supervisor quickly grasps what kind of leadership behavior is optimal for a specific situation
	AL2	My supervisor realizes when his/her leadership style should change due to changes in the situation
	AL3	My supervisor tries to understand the needs of his/her subordinates and adjusts his/her responses in a fitting way
	AL4	My supervisor recognizes changes in task priorities and the need to modify his or her leadership behavior
	AL5	My supervisor is able to focus on and manage the task at hand while keeping an eye on employee's needs
	AL6	My supervisor is able to continuously adjust his/her behavior to the right degree to the circumstances at hand
	AL7	My supervisor is capable of adjusting his/her leadership style based on the needs of his/her subordinates
	AL8	My supervisor is able to balance opposite types of behavior (e.g. controlling vs. empowering) in a way that is appropriate for the situation
	AL9	My supervisor is able to lead through difficulties, ambiguity and complexity
	AL10	My supervisor is able to balance various conflicting needs of different stakeholders
	AL11	My supervisor reacts to unforeseen circumstances or problems with an appropriate response
	AL12	My supervisor adjusts his or her leadership behaviors to the demands of the specific situation
	AL13	My supervisor adapts his or her leadership behavior when unexpected events occur
	AL14	My supervisor stays focused on the goal while remaining flexible in what leadership approaches, he/she uses to achieve the goal
	AL15	My supervisor easily switches between directive and shared leadership according to the actual situation
Sustainable Work Behavior (SWB) Temminck et al. (2015)	SWB1	I make environmental suggestions to improve work procedures
	SWB2	I make suggestions to improve the organization's environmental performance
	SWB3	I try to draw management's attention to potentially environmentally unfriendly activities
	SWB4	I try to make innovative environmental suggestions to improve the organization
	SWB5	I inform management of potentially environmentally irresponsible policies and practices
	SWB6	I am willing to speak up when policy or rules do not contribute to the achievement of the organization's environmental goals
	SWB7	I suggest revisions to work practices to achieve the organization's environmental objectives
Green Self-efficacy Chen et al. (2001) Chen et al. (2015)	GSE1	I feel I can succeed in accomplishing environmental ideas.
	GSE2	I can achieve most of the environmental goals
	GSE3	I feel competent to deal effectively with environmental tasks
	GSE4	I can perform effectively on environmental missions
	GSE5	I can overcome environmental problems
	GSE6	I could find creative solutions to environmental problems
Employees' psychological resilience (EPR) Smith et al. (2008)	EPR1	I tend to bounce back quickly after hard times
	EPR2	I have a hard time making it through stressful events (R)
	EPR3	It does not take me long to recover from a stressful event .
	EPR4	It is hard for me to snap back when something bad happens (R)
	EPR5	I usually come through difficult times with little trouble
	EPR6	I tend to take a long time to get over set-backs in my life (R)

Appendix (B): Model fit and quality indices			
	Assessment	Criterion	Decision
Average path coefficient (APC)	0.430, P<0.001	P<0.05	Supported
Average R-squared (ARS)	0.646, P<0.001	P<0.05	Supported
Average adjusted R-squared (AARS)	0.644, P<0.001	P<0.05	Supported
Average block VIF (AVIF)	2.423	acceptable if ≤ 5, ideally ≤ 3.3	Supported
Average full collinearity VIF (AFVIF)	2.366	acceptable if ≤ 5, ideally ≤ 3.3	Supported
Tenenhaus GoF (GoF)	0.669	small ≥ 0.1, medium ≥ 0.25, large ≥ 0.36	Supported
Sympson's paradox ratio (SPR)	1.000	acceptable if ≥ 0.7, ideally = 1	Supported
R-squared contribution ratio (RSCR)	1.000	acceptable if ≥ 0.9, ideally = 1	Supported
Statistical suppression ratio (SSR)	1.000	acceptable if ≥ 0.7	Supported
Nonlinear bivariate causality direction ratio (NLBCDR)	1.000	acceptable if ≥ 0.7	Supported

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