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A New Transformational Leadership Model Enhancing Sustainable Performance in Manufacturing SMEs Through Entrepreneurial Orientation

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Abstract

This study investigates the relationship between transformational leadership (TL) and sustainable performance (SP) in manufacturing SMEs in Yemen, with entrepreneurial orientation (EO) examined as a mediating variable. Using Partial Least Squares Structural Equation Modeling (PLS-SEM) with bootstrapping, the results confirm that TL significantly enhances EO and SP, while EO itself positively influences SP. Mediation analysis reveals that EO partially mediates the TL–SP relationship, underscoring its role as a strategic conduit through which leadership translates vision into sustainable outcomes. Among TL dimensions, inspirational motivation, intellectual stimulation, and strategic direction significantly drive EO, while charisma and individualized consideration show no direct effect. The findings are theoretically grounded in the Resource-Based View, Dynamic Capabilities Theory, Social Learning Theory, and Upper Echelons Theory, highlighting EO as an intangible resource and adaptive capability that strengthens SMEs' sustainability strategies. Practically, the study emphasizes the importance of leadership behaviors that foster innovation, proactiveness, and risk-taking in resource-constrained environments. Limitations include the context-specific focus on Yemeni SMEs, reliance on cross-sectional data, and exclusion of moderating variables. Future research should adopt longitudinal designs, explore sectoral differences, and expand to underrepresented regions. Overall, the study contributes to both theory and practice by clarifying the mechanisms through which TL and EO jointly enhance sustainable performance in SMEs.

Key words: transformational leadership; entrepreneurial orientation; sustainable performance; small and medium-sized enterprises.

Introduction

The global economy is heavily dependent on small and medium-sized enterprises (SMEs), which form the backbone of business activity and employment creation. In developing countries, SMEs are particularly significant as they contribute to poverty reduction, job generation, and sustainable economic growth (Al-Dhobee et al., 2026). According to the World Bank (2020) and Amoah et al. (2022), SMEs represent nearly 90% of businesses worldwide, account for 25–40% of Gross Domestic Product (GDP), and provide up to 85% of employment opportunities in developing economies. With projections indicating that approximately 600 million new jobs will be required by 2030 to meet the demands of the expanding global workforce (World Bank, 2020), enhancing SME performance has become imperative. Beyond their economic contributions, SMEs also act as drivers of innovation and socio-economic transformation (Gankandage & Jayathilaka, 2025).

Despite these contributions, SMEs in developing economies, often operate under challenging conditions that hinder their potential for sustainable performance (SP) (Al-Swidi et al., 2024). Although these challenges exist, SMEs are increasingly seen as pivotal in fostering sustainable economic recovery. Enhancing the strategic competencies of SME owners or managers must be prioritized. For SMEs to thrive and contribute to sustainable development, Transformational Leadership (TL) and Entrepreneurial Orientation (EO) are indispensable (Al-Dhobee et al., 2026).

TL has emerged as a pivotal competency for achieving firm performance, as it emphasizes motivating followers to transcend individual interests in pursuit of collective organizational goals. It has become a cornerstone of contemporary leadership theory (Bass, 1999; Bass, 2006), with empirical evidence affirming its role in enhancing organizational commitment, fostering innovation, and promoting SP (Burawat, 2019; Widisatria & Nawangsari, 2021; Bhatti et al., 2023; Tosun et al., 2022; Althnayan et al., 2022; Nasir et al., 2022; Mohammed, 2023; Al-Dhobee et al., 2026). However, the impact of TL on SMEs' SP has not been sufficiently clarified and requires further exploration, particularly with regard to mediating variables (Al-Dhobee et al., 2025b; Piwowar-Sulej & Iqbal, 2023).

EO has also gained significant attention in both theoretical and practical domains due to its role in enhancing organizational performance. In the SME context, EO is regarded as a critical factor in improving competitiveness and sustainability (Gupta & Batra, 2016; Kiyabo & Isaga, 2020; Gazali & Zainurrafiqi, 2023). Previous studies indicate that EO enhances sustainability initiatives in SMEs, particularly in challenging environments (Ali et al., 2023; Sorama & Joensuu-Salo, 2022; Adomako & Nguyen, 2020). While TL provides the framework and direction, EO translates strategies into action through innovative and proactive approaches. In line with this, EO can transform strategic visions into actionable initiatives. Therefore, EO may act as a mediator between TL and SP, a relationship that requires both empirical validation and theoretical clarification.

The global transition toward sustainability has introduced new pressures on manufacturing SMEs, particularly in aligning their operations with economic, environmental, and social imperatives. These pressures include the need to enhance social performance and fulfill national commitments to societal well-being (Al-Dhobee et al., 2025a, 2025b, 2026; Etomes et al., 2024; Zhu & Huang, 2023).

The current study identifies several critical gaps in the literature concerning TL, EO, and SP, particularly within the context of developing economies such as Yemen.

First, The contribution of Yemeni SMEs to sustainable development remains limited compared to other developing countries, highlighting the need for empirical investigations into their practices and leadership strategies.

Second, Numerous studies have examined the relationship between EO and firm performance, particularly in developing countries (e.g., Hapsari et al., 2024; Löffel & Gmür, 2024; Gazali & Zainurrafiqi, 2023; Ononye et al., 2022; Asad et al., 2024a; Sorama & Joensuu-Salo, 2022). Parallel research has explored the impact of TL on SME performance (e.g., Lin et al., 2022; Darvishmotevali & Altinay, 2022; Pham et al., 2023; Hanif et al., 2023). However, no study has examined the mediating role of EO between TL and SP.

Third, While EO is widely recognized as a key driver of SME competitiveness and performance, research reveals inconsistencies in its effects—particularly regarding economic and environmental sustainability (Sheng, 2023). Future studies must explore the complex and context and construct-dependent relationship between EO and sustainability practices within SMEs (Malesios et al., 2021).

Forth, Only a limited number of studies have examined EO's influence on SP across economic, social, and environmental dimensions (Niemann et al., 2020; Al-Dhobee et al., 2025a). Much of the existing literature focuses on Entrepreneurial Sustainable Orientation (ESO) and Green Entrepreneurial Orientation (GEO), rather than EO itself. Some studies report a positive association between EO and SP, while others suggest EO influences SP primarily through mediating or moderating variables.

Fifth, The majority of studies linking TL and SP have been conducted in East Asian economies, where environmental awareness is relatively advanced. There is a notable scarcity of research in Middle Eastern, African, and South Asian contexts, where SMEs operate under distinct regulatory and socio-economic conditions (Piwowar-Sulej & Iqbal, 2023; Al-Dhobee et al., 2026).

Sixth, Bass's conceptualization of TL has been critically evaluated, leading scholars to propose new models by adding dimensions such as environmental sensitivity (Conger & Kanungo, 1994) and identity processes (Shamir et al., 1993). This reflects the lack of consensus on TL conceptualization (Hughes et al., 2018; Van Knippenberg & Sitkin, 2013) and calls for enhancing TL theory. Evaluating TL's impact on SP, with particular attention to mediating and moderating mechanisms, is necessary to strengthen TL theory.

Moreover, the majority of existing literature focuses on green transformational leadership (GTL), rather than TL itself (Lin et al., 2022; Bhatti et al., 2023; Zhao & Huang, 2022; Luo et al., 2025; Sun et al., 2022; Tosun et al., 2022; Hanif et al., 2023).

In light of these gaps, it becomes evident that the relationship between TL, EO, and SP remains underexplored, particularly within the context of developing economies. Existing studies have either

focused on isolated constructs or examined them in different cultural and institutional settings, leaving unanswered questions about how TL's multidimensional nature interacts with EO to influence SP. Furthermore, the lack of consensus on TL's conceptualization, combined with inconsistent findings on EO's impact, underscores the need for a more integrated and context-specific model. Addressing these issues will not only contribute to theoretical advancement but also provide practical insights for SME leaders and policymakers seeking to enhance SP under challenging socio-economic conditions.

Research Questions:

1) What is the impact of TL on SP in manufacturing SMEs?
2) What is the impact of TL and its dimensions (including strategic direction) on EO in manufacturing SMEs?
3) What is the impact of EO on SP in manufacturing SMEs?
4) Does EO mediate the relationship between TL and SP in manufacturing SMEs?

This study provides both theoretical and practical insights by integrating TL, EO, and SP into a unified conceptual framework tailored to the context of manufacturing SMEs in Yemen. By extending TL with a fifth dimension—strategic direction—the research advances leadership theory beyond traditional models that often treat TL as a monolithic construct. It also responds to the lack of consensus on TL's conceptualization and addresses calls for examining its differentiated components and mediating mechanisms. Furthermore, by positioning EO as a mediator, the study clarifies how leadership vision can be translated into proactive strategies that enhance economic, social, and environmental performance. The contribution is particularly significant in Yemen, where SMEs face unique socio-economic and institutional challenges and where empirical evidence remains scarce. Thus, the study enriches global scholarship while offering actionable guidance for SME leaders and policymakers in developing economies, bridging theoretical gaps and providing a comprehensive model for SP.

Literature review

For the purpose of this study, TL is defined as the ability of SME leaders to inspire and motivate followers through charisma, inspirational motivation, intellectual stimulation, individualized consideration, and the newly integrated dimension of strategic direction. Bass (1985, 1990, 2000) emphasized that transformational leaders create inspiring visions, communicate high expectations, stimulate problem-solving, and provide individualized support, while Boal and Hooijberg (2000) highlighted charisma as the capacity to reshape followers' worldviews to drive real change. Building on Nthini (2013), Strategic Direction is incorporated as a critical dimension, reflecting leaders' competence to overcome obstacles, articulate long-term visions, and align organizational goals with sustainability. In parallel, EO is defined as SMEs' ability to generate innovative ideas, embrace risk, and act proactively to achieve competitive advantage and SP (Miller, 1983). Finally, SP is understood as the balanced integration of economic growth, social inclusiveness, and environmental resilience, ensuring value needs for both current and future generations (Geissdoerfer, 2017).

Foundational Theories

The present study contributes theoretically by; examining the mediating impact of EO on the relationship between TL and SP of SMEs in Yemen based on Resource-Based View Theory (RBVT), Dynamic Capabilities Theory (DCT), Soial Learning Theory (SLT) and Upper Echlon Theory (UET). to interpret the conceptual model of this relationship.

RBVT emphasizes that firms achieve sustainable competitive advantage through valuable, rare, inimitable, and non-substitutable (VRIN) resources (Barney, 1991), positioning TL as a strategic intangible resource that converts employee skills and knowledge into financial, social, and environmental outcomes (Khanra et al., 2022; Özgül & Zehir, 2023). Extending RBVT, the DCT highlights the importance of sensing, seizing, and transforming capabilities to reconfigure resources in rapidly changing environments (Teece et al., 1997; Eisenhardt & Martin, 2000), thereby linking TL and EO to adaptive competencies that drive sustainability innovations (Mousavi et al., 2018; Bari et al., 2022). SLT provides a behavioral lens, suggesting that employees acquire knowledge and skills by observing leaders as role models (Bandura, 1986), with TL fostering creativity, self-efficacy, and pro-environmental behaviors that enhance organizational citizenship and sustainable practices (Clarke, 2013; Khan et al., 2019). Finally, UET underscores the role of leaders' values, experiences, and cognitive frames in shaping strategic choices (Hambrick & Mason, 1984; Hambrick, 2007), with transformational leaders influencing EO by instilling innovativeness, proactiveness, and risk-taking that align with sustainability-oriented strategies (Cui et al., 2023; Liao & Zhang, 2020). Together, these theories provide a robust foundation for interpreting TL as both a strategic resource and behavioral mechanism, EO as a dynamic capability, and SP as the ultimate outcome of leadership-driven organizational strategies.

This study enhances the four foundational theories by extending their application to the SME sustainability context and integrating them into a unified conceptual framework. It advances RBVT by positioning TL as a strategic VRIN resource that transforms human capital into sustainable outcomes. It enriches the DCT by demonstrating how TL and EO jointly build sensing, seizing, and transforming capabilities that enable SMEs to adapt and innovate under resource constraints. It strengthens SLT by showing how leaders act as role models, fostering creativity, pro-environmental behaviors, and organizational citizenship that drive sustainable practices. Finally, it contributes to UET by highlighting how leaders' values, traits, and cognitive frames shape EO and sustainability-oriented strategies. Collectively, the study not only validates these theories in a developing economy context but also integrates them to explain how TL and EO interact to enhance SMEs' economic, social, and environmental performance See figure 1.

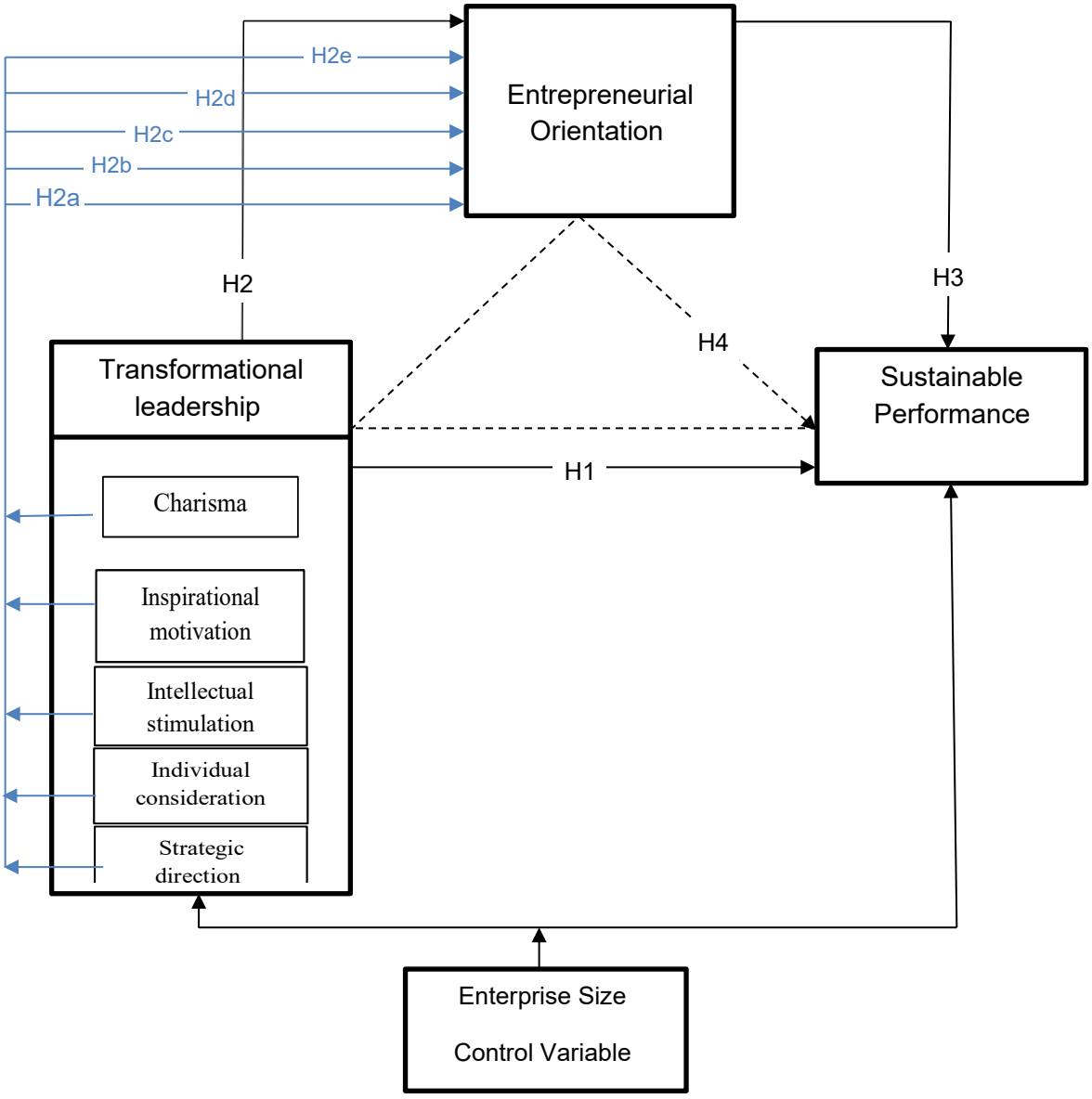


Figure .1 Study Conceptual Model.

Study Hypotheses

Transformational leadership and Manufactruing SMEs sustainable Performance:

Empirical evidence underscores the significance of transformational and green leadership in enhancing SP. Bhatti et al. (2023) found that green TL significantly influences both green capability and SP, with top management commitment acting as a moderator. Similarly, Lin et al. (2022)

demonstrated that green TL positively affects SP through the mediating role of organizational citizenship behavior toward the environment (OCBE).

Luo et al. (2025) highlighted the integration of green TL with Green Human Resource Management (GHRM) practices—such as green training, job analysis, and intellectual stimulation—as key drivers of SP. Ahsan (2024) also confirmed that TL, when embedded within a supportive organizational culture, enhances both CSR and financial outcomes.

Shahzad et al. (2022) revealed that TL improves firm performance through corporate sustainability. In contrast, Tosun et al. (2022) found no direct relationship between green TL and green performance, noting that CSR mediates this link.

Other studies have reinforced the indirect pathways through which TL affects SP. Althnayan et al. (2022) confirmed that environmental TL enhances SP via OCBE. Nasir et al. (2022) demonstrated that TL, particularly when integrated with Industry 4.0 technologies, significantly boosts innovation and SP in Pakistan's textile sector. Similarly, Mohammed (2023) found that TL positively influences both social responsibility and SP.

Charismatic leadership, a dimension of TL, has also been linked to enhanced environmental performance. Zhang and Wei (2021) found that charismatic leadership significantly improves stakeholder-focused environmental performance and contributes to financial outcomes through the effective use of intangible resources. This aligns with earlier assertions by Conger and Kanungo (1987) and Hart (1995), who emphasized the strategic value of visionary leadership and environmental stewardship as rare and valuable organizational assets. Aragon et al. (2008) similarly argued that SME leaders can enhance environmental performance by embedding sustainability into strategic planning.

Burawat (2019) explored the structural links between TL, sustainable leadership, lean manufacturing, and SP in Thai SMEs, concluding that leadership fosters lean practices that support SP.

From a theoretical standpoint, TL can be understood as a strategic resource under RBV (Barney, 1991), a DC that enables sensing, seizing, and transforming for sustainability (Teece et al., 1997), a SLT that models pro-environmental behaviors (Bandura, 1986), and an upper-echelon influence where leaders' values and cognitive frames shape sustainability-oriented strategies (Hambrick & Mason, 1984). Collectively, these perspectives reinforce the expectation that TL directly and positively impacts SMEs' SP. Therefore, based on previous arguments, a fresh look at the impact of TL on SMEs SP has to be given. Thus, one major hypothesis can be formulated as follows:

H1: TL has a significant positive impact on the SP of manufacturing SMEs.

Transformational leadership and Entrepreneurial Orientation:

The capacity of leaders to inspire, intellectually stimulate, and strategically guide their organizations plays a pivotal role in shaping entrepreneurial behaviors, including innovativeness, proactiveness, and risk-taking.

Empirical studies have consistently demonstrated that TL positively influences EO. Nofal and Jaradat (2020), in their study of Jordanian commercial banks, found that inspirational motivation and intellectual stimulation significantly enhanced EO, while idealized influence (charisma) and individualized consideration did not. This suggests that cognitive and motivational dimensions of leadership are more instrumental in fostering entrepreneurial behavior than relational traits.

Khorshid et al. (2023) extended this understanding by examining TL in academic departments, revealing that it positively affects EO through the mediating role of faculty members' speaking-up behavior. Similarly, Qadir et al. (2024) demonstrated that empowering leadership significantly influences EO by reducing work uncertainty, which in turn mediates the relationship between leadership and the core EO dimensions—risk-taking, proactiveness, and innovativeness. These findings underscore the importance of leadership in shaping employees' perceptions of uncertainty and enabling entrepreneurial action.

The relationship between leadership and innovation is further supported by Asad et al. (2024a), who found that both green EO and green TL significantly enhance green product innovation and overall performance. Le and Lei (2019) confirmed that TL fosters product and process innovation through knowledge sharing, moderated by perceived organizational support. Likewise, Shafique and Kalyar (2018) demonstrated that TL positively influences corporate entrepreneurship—specifically innovation, venturing, and strategic renewal—through absorptive capacity.

Lei et al. (2021) added that TL promotes frugal innovation by facilitating both tacit and explicit knowledge sharing, thereby enhancing functionality, cost-efficiency, and ecosystem development. These findings collectively affirm that leadership fosters EO by cultivating a knowledge-rich, innovation-oriented environment.

Ameer and Khan (2020) provided strong empirical support for the UET and DC perspective, showing that managerial characteristics—such as age—positively influence strategic entrepreneurial orientation (SEO), which in turn mediates the relationship between leadership traits and SP. This reinforces the notion that leadership is not only a behavioral construct but also a strategic resource shaped by individual and contextual factors.

Javed et al. (2017) and Jansen et al. (2009) both confirmed that inclusive and TL styles are positively associated with innovation and entrepreneurial behavior. Wheelen and Hunger (1992) similarly reported that both transformational and transactional leadership sub-dimensions contribute to organizational innovativeness. Obeidat et al. (2018) emphasized the critical role of inspirational motivation and intellectual stimulation in enhancing EO, while Renko et al. (2015) argued that

leadership, as a form of entrepreneurial behavior, is essential for recognizing individual value and fostering adaptability in sustainability-driven contexts.

Pittino et al. (2017) offered a nuanced perspective by identifying 12 configurations of motivations and personality traits that lead to EO across different strategic leadership contexts—such as successors of family businesses, family-oriented founders, and non-family founders. Their qualitative comparative analysis of 257 Italian SME owner-managers revealed that EO is shaped by the interplay of internal motivations and external constraints, moderated by leadership configurations and organizational embeddedness. From a theoretical standpoint, TL can be understood through RBVT as a valuable intangible resource that strengthens organizational innovativeness (Barney, 1991). DCT highlights TL's role in building adaptive capabilities that enable SMEs to sense opportunities, seize them, and transform resources into entrepreneurial action (Teece et al., 1997; Yu et al., 2019). SLT explains how leaders act as role models, fostering creative self-efficacy and encouraging employees to emulate entrepreneurial behaviors (Bandura, 1986; Renko et al., 2015). UET emphasizes that leaders' values, traits, and cognitive frames shape EO, with managerial characteristics influencing strategic EO and SP (Hambrick & Mason, 1984; Ameer & Khan, 2020).

Collectively, these perspectives and empirical findings affirm that TL is a key driver of EO in SMEs, enabling firms to cultivate innovation, proactiveness, and risk-taking behaviors that strengthen competitiveness and sustainability. Based on this discussion, following main hypothesis and five sub-hypotheses haves been formulated:

H2: TL has a significant positive impact on EO of manufacturing SMEs.

H2a: Charisma has a significant positive impact on EO of manufacturing SMEs.

H2b: Inspirational motivation has a significant positive impact on EO of manufacturing SMEs.

H2c: Intellectual stimulation has a significant positive impact on EO of manufacturing SMEs.

H2d: Individualized consideration has a significant positive impact on EO of manufacturing SMEs.

H2e: Strategic direction has a significant positive impact on EO of manufacturing SMEs.

Entrepreneurial Orientation and Sustainable Performance

EO has long been associated with firm performance since its introduction (Miller, 1983), and recent scholarship extends this relationship to sustainability outcomes. Empirical studies confirm that EO—through innovativeness, proactiveness, and risk-taking—positively influences financial, environmental, and social performance across diverse contexts. For instance, green EO enhances financial and environmental outcomes in Chinese and Bangladeshi firms (Jiang et al., 2018; Habib et al., 2020), while EO significantly improves SME performance in Asia when innovation and proactiveness are high (Hapsari et al., 2024). EO has also been shown to strengthen cooperatives' economic performance (Löffel & Gmür, 2024), mediate performance through network resource

acquisition (Gazali & Zainurrafiqi, 2023), and drive innovation and operational sustainability when combined with green manufacturing and leadership (Ononye et al., 2022; Asad et al., 2024). Contextual factors such as institutional environments, eco-innovation policies, and strategic alliances further moderate EO's impact on sustainability (Basco et al., 2020; Ahsan et al., 2023; Riwu Kore et al., 2024).

From a theoretical perspective, EO can be interpreted through RBVT as a strategic intangible resource that enables SMEs to exploit opportunities and sustain competitive advantage (Barney, 1991). DCT highlights EO as a mechanism for sensing opportunities, seizing them through innovation, and transforming resources to achieve sustainability (Teece et al., 1997). SLT explains how leaders foster entrepreneurial behaviors by modeling risk-taking and proactive attitudes that employees emulate (Bandura, 1986; Renko et al., 2015). Finally, UET emphasizes that leaders' traits and cognitive frames shape EO, which in turn drives economic, social, and environmental performance (Hambrick & Mason, 1984; Ameer & Khan, 2020).

Together, these theoretical perspectives and empirical findings affirm EO as a strategic driver of SP, enabling SMEs to integrate innovation, proactiveness, and risk-taking into sustainability-oriented strategies.

H3 : EO has a significant positive impact on the SP of manufacturing SMEs.

The mediating role of Entrepreneurial Orientation between Transformational Leadership and Sustainable Performance of SMEs.

Empirical evidence strongly supports the mediating role of EO in linking TL to SP. Fatoki (2019) demonstrated that sustainable EO enhances innovativeness, proactiveness, and risk-taking, which in turn improve organizational sustainability outcomes. Maaodhah et al. (2021), using RBV, confirmed that EO positively influences firm performance in Malaysian SMEs. Yacob et al. (2021) highlighted EO's moderating role in e-commerce adoption, showing its importance in improving MSME sustainability. Al Mamun et al. (2018) revealed that EO dimensions such as innovativeness, proactiveness, and autonomy enhance entrepreneurial competencies, which mediate performance outcomes. Similarly, Hou et al. (2019) and Zehir et al. (2016) confirmed EO's mediating role between innovation and performance, and between strategic HRM and financial outcomes.

From a theoretical perspective, EO acts as a strategic resource under RBV, converting leadership-driven capabilities into sustainable outcomes (Barney, 1991). DCT explains EO as a mechanism that enables SMEs to sense opportunities, seize them through innovation, and transform resources for sustainability (Teece et al., 1997). SLT highlights how TL fosters entrepreneurial behaviors by modeling risk-taking and proactive attitudes that employees emulate (Bandura, 1986). Finally, UET emphasizes that leaders' traits and cognitive frames shape EO, which mediates the link between leadership and sustainability (Hambrick & Mason, 1984; Ameer & Khan, 2020).

Empirical studies further reinforce this theoretical integration: EO mediates TL's effect on performance in Portuguese SMEs (Leite & Rua, 2022), enhances innovation outputs in family and non-family firms (Ingram et al., 2022), and strengthens lecturer performance in educational institutions (Ridha et al., 2023). Innovation capabilities and entrepreneurial activities have also been shown to partially mediate EO–SP relationships (Abid et al., 2023; Zacca et al., 2022). Collectively, these findings affirm EO as a strategic conduit through which TL translates into sustainable economic, social, and environmental outcomes.

H4 : EO significantly mediates the relationship between TL and SP of manufacturing SMEs.

Methodology

The study adopted a quantitative survey design to ensure methodological rigor and generate valid, reliable findings. A quantitative approach was selected for its objectivity, generalizability, and statistical robustness (Creswell, 2014), making it appropriate for business and social science research. To minimize bias and enhance representativeness, a probability-based stratified random sampling method was employed. The research design was cross-sectional, collecting data at a single point in time, a common approach in organizational and management studies (Wang & Cheng, 2020).

Sample and Data Collection

Data were collected from 199 Yemeni manufacturing SMEs, drawn from the Ministry of Industry and Trade database. Stratified random sampling ensured equal selection opportunity (Sekaran & Bougie, 2010). With a total population of 5,533 firms, Krejcie and Morgan's (1970) formula indicated a minimum sample size of 366; this was increased to 440 to reduce error and account for non-response (Hair & Ringle, 2011). Managers/owners served as respondents due to their knowledge of firm operations. A self-administered questionnaire was distributed via email and WhatsApp, yielding 210 responses, of which 199 were valid (43% response rate). Statistical adequacy was confirmed using GPower*, which indicated a minimum of 68 cases; thus, 199 responses were sufficient. Data collection spanned June–December 2023.

Data Screening and Preliminary Analysis

Data were screened for missing values, outliers, and distributional properties to ensure accuracy before hypothesis testing. Missing data were handled using trimmed mean comparison (Pallant, 2020). Outliers were identified using the Mahalanobis Distance Threshold ($\chi^2 = 22.458$, $p < 0.001$).

Measurement of Constructs

A structured questionnaire was developed using validated scales. Items were measured on a seven-point Likert scale (1 = strongly disagree, 7 = strongly agree). TL was measured with 13 items across four dimensions (charisma, inspirational motivation, intellectual stimulation, individualized

consideration) adapted from Bass et al. (1985) and Aslan (2011), plus a fifth dimension—strategic direction—adapted from Nthini (2013). EO was measured with 13 items across three dimensions (innovativeness, proactiveness, risk-taking) from Covin & Slevin (1989). SP was assessed with 13 items covering economic, social, and environmental performance, adapted from Abdul-Rashid et al. (2016). Some modifications ensured clarity and contextual relevance for Yemeni SMEs. A forward–backward translation procedure and pilot testing with five SME managers confirmed linguistic validity and cultural appropriateness. Prior to hypothesis testing, factor analysis and goodness-of-fit tests were conducted to validate construct reliability and model adequacy.

Factor analysis results

The factor analysis confirms the adequacy of the data for extracting a five-factor structure. The KMO value of 0.618 and the highly significant Bartlett's Test ($p < 0.001$) indicate that the sample is suitable for factor analysis. The five extracted factors explain 68.075% of the total variance, demonstrating strong explanatory power. Importantly, the analysis validates the inclusion of strategic direction as a fifth dimension of TL, alongside charisma, inspirational motivation, intellectual stimulation, and individualized consideration. This integration strengthens the theoretical framework by broadening TL's scope and supports its application in examining EO and SP in SMEs (see table 1 and 2).

Table 1. KMO and Bartlett's Test of TL

Measure	Value
Kaiser-Meyer-Olkin (KMO) Sampling Adequacy	0.618
Bartlett's Test of Sphericity (χ^2)	140,223.003
Degrees of Freedom (df)	325
Significance (Sig.)	< 0.001

Table 2. Variance Explained by Factors

Factor	Initial Eigenvalues (%)	Rotation (%)
1	30.452	2.581
2	12.995	2.740
3	9.565	2.243
4	8.124	2.079
5 (Strategic Direction)	6.938	2.489
Total Variance Explained	—	68.075%

The validation of TL with five distinct dimensions—including the newly integrated strategic direction—strengthens the theoretical foundation of this study. By confirming the robustness of the measurement model, the factor analysis provides empirical support for examining how TL influences EO and, in turn, SP. The clear identification of these dimensions ensures that the subsequent structural model analysis can meaningfully test the hypothesized mediating role of EO, thereby aligning the measurement results with the overall conceptual framework of TL → EO → SP.

Goodness of Fit (GoF) Results

The calculated GoF value of 0.267 falls within the medium range according to Wetzels et al. (2009), who classify GoF values as small (<0.10), medium (0.10–0.36), and large (>0.36) (see table 3). This indicates that the proposed model demonstrates a moderate overall fit, explaining a reasonable proportion of variance in the endogenous constructs (EO and SP) while also showing acceptable predictive relevance. Although the model does not reach the "large" threshold, the medium GoF supports the validity of the conceptual framework and provides sufficient justification for testing the hypothesized mediating role of EO between TL and SP.

Table 3. Goodness of Fit (GoF) Calculation

Statistic	EO	SP	Average Value
R^2	0.310	0.312	0.311
Q^2 (predictive relevance)	0.293	0.165	0.229
GoF			0.267

Multicollinearity and Common Method Bias

Variance Inflation factor (VIF) statistics is utilized to assess multicollinearity, as it is not a serious issues if the value for VIF is below 5.In our study, the VIF for each of the indicators is below the recommended threshold. As it is presented in Table 4.

Table 4. Multicollinearity statistics (VIF) for indicators

Item	VIF
CHA1	1.544
CHA2	1.544
ECON2	1.433
ECON4	1.493
ENVI2	1.795
ENVI4	2.198
INDI1	1.254
INDI2	1.580
INDI3	1.546
INNOV2	1.909
INNOV3	1.743
INNOV4	1.890
INSP1	2.016
INSP2	1.883
INSP3	1.869
INSP4	1.586
INTEL1	1.121
INTEL2	1.251
INTEL3	1.261
PROAC1	1.724
PROAC2	1.676
PROAC3	2.443
PROAC4	2.227
STD1	1.285
STD2	1.942
STD3	1.598
SOCAI3	1.622
SOCAI4	1.620

To evaluate potential common method bias (CMB), Harman's single-factor test was conducted. The unrotated factor solution revealed that the largest single factor accounted for 28.2% of the total variance, which is substantially below the recommended cut-off of 50% (Podsakoff et al., 2012). Based on these results, CMB was not considered a significant threat to the validity of the empirical findings.

Measurement Model

Measurement Model – Lower-Order Constructs (LOC)

In evaluating the reflective measurement items, the study followed the guidelines of Hair et al. (2011; 2016), assessing construct reliability, convergent validity, and discriminant validity at both the lower-order construct (LOC) and higher-order construct (HOC) levels. For the LOC stage, construct reliability and validity were examined in line with Hair et al. (2021). Indicators with factor loadings below 0.50 were removed to strengthen convergent validity, while retained items demonstrated loadings ranging from 0.576 to 0.933, meeting recommended thresholds. Internal consistency reliability was confirmed through Cronbach's alpha and composite reliability (CR), with values ranging from 0.601 to 0.845 for alpha and 0.783 to 0.883 for CR, exceeding minimum standards and indicating satisfactory reliability see table 5 and figure 2. Convergent validity was established, regarding the average variance extracted (AVE) values for all constructs exceeded the 0.50 threshold, except for SP, which recorded 0.480. However, since CR values for all constructs were above 0.70, convergent validity remained acceptable (Fornell & Larcker, 1981; Lam, 2012; Hair et al., 2014) see table 5.

Table 5. Item loadings, reliability, and validity of the constructs

First-order constructs	Items	Factor loading	CR	AVE	Cronbach's Alpha
CHA	CHA1	0.933	0.883	0.791	0.745
	CHA2	0.843			
	INSP1	2.016			
	INSP2	1.883			
	INSP3	1.869			
INSP	INSP4	1.586	0.854	0.597	0.778
	INTEL1	0.616			
	INTEL2	0.823			
INTELL	INTEL3	0.768	0.783	0.549	0.601
	INDI1	0.647			
	INDI2	0.885			
INDI	INDI3	0.836	0.836	0.633	0.715
	STD1	0.645			
STD	STD2	0.907	0.830	0.624	0.691
	STD3	0.797			
	EO1	0.739			
	EO2	0.686			
	EO3	0.736			
	EO4	0.644			
	EO5	0.659			
	EO6	0.768			
EO	EO7	0.783	0.881	0.516	0.845
	SP1	0.576			
	SP2	0.615			
	SP3	0.686			
	SP4	0.794			
	SP5	0.600			
SP	SP6	0.589	0.811	0.480	0.720

Regarding the discriminant validity refers to the extent to which a construct is empirically distinct from other constructs in the model (Hair et al. 2022). In this study, discriminant validity was assessed using three established methods: the Fornell–Larcker criterion, cross-loadings, and the

heterotrait–monotrait ratio (HTMT). The Fornell–Larcker criterion confirmed validity as the square root of the AVE for each construct (Table 6) was consistently greater than its correlations with other constructs (Fornell & Larcker, 1981). Cross-loadings further supported discriminant validity, as items loaded more strongly on their respective constructs than on others (Table 7). Finally, HTMT results (Table 8) showed that all values were below the conservative threshold of 0.85 (Kline, 2011), thereby reinforcing the distinctiveness of the constructs. Collectively, these results provide strong evidence that discriminant validity was achieved in the measurement model. Collectively, all of all results confirm that the LOCs demonstrate adequate construct reliability, internal consistency, and convergent validity, thereby supporting the robustness of the measurement model.

Table 6 Discriminant Validity- Fornell&Larcker criterion.

Construct	CHA	EO	INDI	INSP	INTELL	SO	SP
CHA	0.889						
EO	0.334	0.718					
INDI	0.289	0.369	0.796				
INSP	0.369	0.448	0.344	0.772			
INTELL	0.338	0.438	0.403	0.451	0.741		
STD	0.295	0.417	0.533	0.317	0.500	0.790	
SP	0.354	0.531	0.460	0.254	0.205	0.275	

Table 7 Discriminant Validity- Cross loadings

Item	CHA	INSP	INTELL	INDI	SO	EO	SP
CHA1	0.933	0.328	0.357	0.296	0.302	0.344	0.367
CHA2	0.843	0.334	0.223	0.204	0.208	0.233	0.243
INSP1	0.370	0.856	0.422	0.262	0.252	0.445	0.222
INSP2	0.259	0.819	0.388	0.348	0.272	0.390	0.170
INSP3	0.291	0.773	0.267	0.245	0.246	0.305	0.216
INSP4	0.182	0.621	0.301	0.198	0.214	0.172	0.184
INTEL1	0.253	0.235	0.616	0.343	0.392	0.273	0.057
INTEL2	0.224	0.432	0.823	0.273	0.352	0.372	0.225
INTEL3	0.291	0.305	0.768	0.309	0.391	0.320	0.143
INDI1	0.375	0.142	0.229	0.647	0.353	0.153	0.246
INDI2	0.188	0.207	0.289	0.885	0.446	0.388	0.437
INDI3	0.210	0.457	0.440	0.836	0.472	0.285	0.379
STD1	0.210	0.405	0.285	0.472	0.645	0.253	0.165
STD2	0.328	0.282	0.559	0.407	0.907	0.414	0.218
STD3	0.149	0.107	0.302	0.416	0.797	0.302	0.264
INNOV2	0.317	0.312	0.453	0.388	0.403	0.739	0.361
INNOV3	0.268	0.240	0.245	0.278	0.321	0.686	0.327
INNOV4	0.257	0.344	0.436	0.406	0.463	0.736	0.354
PROAC1	0.193	0.226	0.128	0.219	0.272	0.644	0.385
PROAC2	0.130	0.121	0.162	0.108	0.222	0.659	0.198
PROAC3	0.256	0.433	0.369	0.202	0.219	0.768	0.536
PROAC4	0.201	0.447	0.277	0.176	0.166	0.783	0.406
ECON2	0.332	0.080	0.140	0.186	0.123	0.180	0.576
ECON4	0.206	0.037	0.147	0.172	0.166	0.439	0.615
ENVI2	0.169	0.230	0.156	0.354	0.147	0.406	0.686
ENVI4	0.264	0.234	0.090	0.358	0.242	0.373	0.794
SOCAI3	0.220	0.177	0.154	0.341	0.159	0.318	0.600
SOCAI4	0.228	0.189	0.121	0.340	0.215	0.292	0.589

Table 8 Discriminant Validity- HTMT

Construct	CHA	EO	INDI	INSP	INTELL	SO	SP
CHA							
EO	0.392						
INDI	0.429	0.437					
INSP	0.470	0.492	0.446				
INTELL	0.499	0.585	0.637	0.634			
STD	0.394	0.528	0.778	0.459	0.780		
SP	0.484	0.645	0.622	0.333	0.305	0.384	

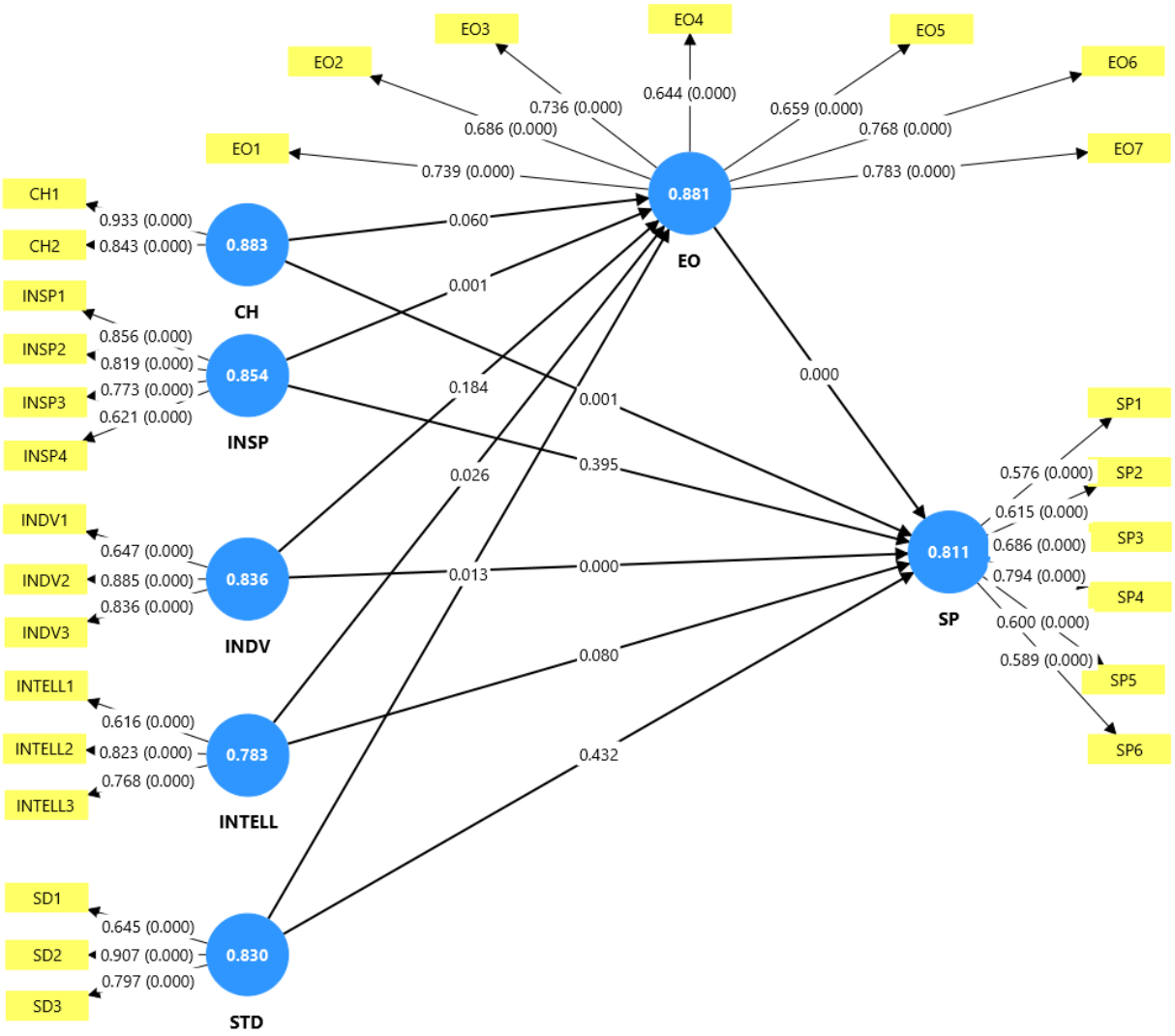


Figure 2 Measurement Model – Lower-Order Constructs (LOC) evaluation.

Validating Higher Order construct

Higher-Order Constructs (HOC)

The evaluation of higher-order constructs (HOCs), such as EO, followed the same procedure applied to lower-order constructs (LOCs). In this study, TL was modeled as a second-order construct, with charisma, inspirational motivation, individualized consideration, intellectual stimulation, and strategic direction serving as its first-order dimensions. The values of these indicators were obtained during the LOC analysis and subsequently used to assess the validity and reliability of TL at the HOC level.

The HOCs were validated using the bootstrapping approach with 5,000 resamples, consistent with recommended guidelines (Hair et al., 2011). Reliability and validity results (SeeTable 9 and figure 3) confirmed that all HOCs met the required thresholds. Collinearity was examined through VIF values, all of which were below the recommended threshold of 5 (Hair et al., 2017), indicating no multicollinearity concerns (see table 10).

Discriminant validity was assessed using the Fornell–Larcker criterion and the heterotrait–monotrait ratio (HTMT). Results showed that the square root of AVE for each construct was greater than its correlations with other constructs (Table 11), satisfying the Fornell–Larcker criterion (Fornell & Larcker, 1981). HTMT values were consistently below 0.90 (Table 12), meeting the recommended thresholds (Kline, 2011; Teo et al., 2008; Sarstedt et al., 2019).

The results confirm that the higher-order constructs are reliable, valid, and empirically distinct from one another, thereby supporting the robustness of the measurement model at both the LOC and HOC levels.

Table 9 higher order construct reliability and validity

Variable	Cronbach's alpha	Composite reliability (rho_c)
EO	0.845	0.881
TL	0.768	0.843
SP	0.720	0.810

Table 10: VIF of the LOCs for the HOC

Construct	VIF
CH	1.240
ECON2	1.433
ECON4	1.493
ENVI2	1.795
ENVI4	2.198
INNOV2	1.909
INNOV3	1.743
INNOV4	1.890
INSP	1.381
INTEL	1.582
PROAC1	1.724
PROAC2	1.676
PROAC3	2.443
PROAC4	2.227
SDT	1.638
SOCAI3	1.622
SOCAI4	1.620

iND	1.492

Table 11 Fornell and larcker (1981) criterion higher order discriminant validity.

Construct	EO	TL	SP
EO	0.718		
SL	0.563	0.714	
SP	0.535	0.437	0.648

Table 12. HTMT higher order discriminant validity.

Construct	EO	TL	SP
EO			
TL	0.673		
SP	0.645	0.585	

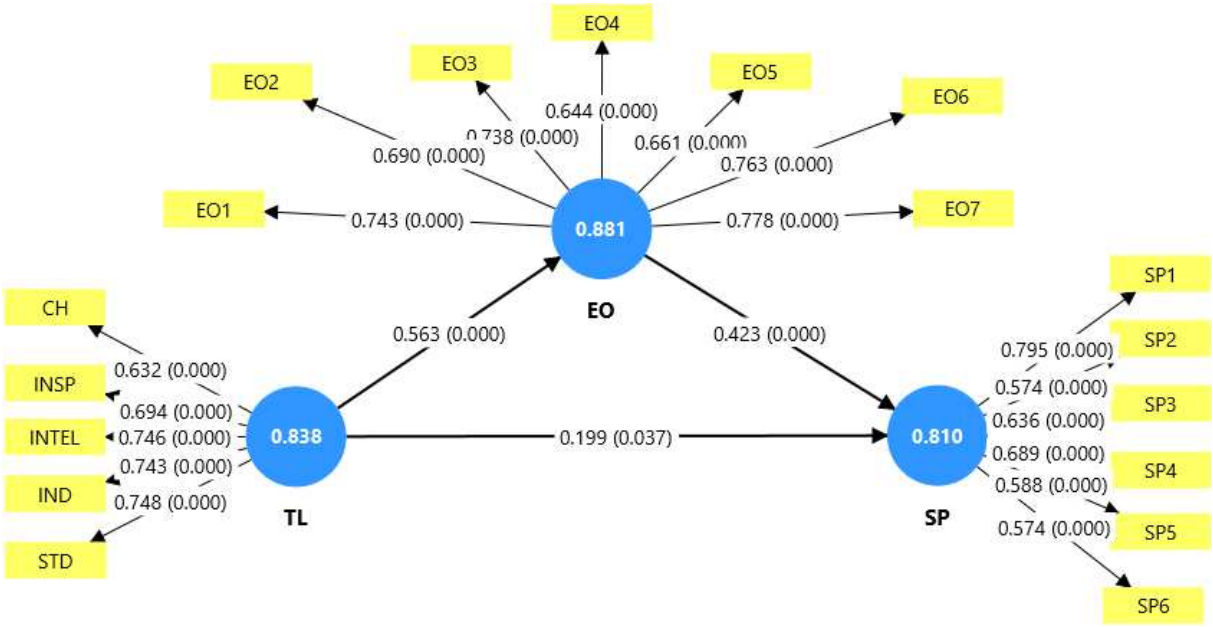


Figure 3 Measurement Model – Higher-Order Constructs (HOC) evaluation.

A one-way ANOVA was conducted to examine whether SP varied according to enterprise size and age among SMEs. The results revealed no statistically significant differences across groups, $F(1, 197) = 1.895$, $p > .001$, indicating that neither firm size nor age meaningfully influenced SP outcomes (Table 13). From a theoretical perspective, these findings suggest that structural attributes alone are insufficient to explain sustainability practices. RBV emphasizes that competitive advantage arises from intangible resources and capabilities rather than firm size, while DCT highlights adaptability and resource reconfiguration as more critical than static characteristics such as age. UET further underscores the role of managerial values and leadership behaviors in shaping organizational outcomes. Practically, this implies that both small and medium-sized enterprises in Yemen engage in sustainability practices at comparable levels, with SP better explained by TL and EO.

Table 13: Analysis of Variances Test ANOVA – based on Size of Entrprize.

SP

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	,849	1	,849	1,895	,170
Within Groups	88,215	197	,448		
Total	89,064	198			

Evaluate the Structural Model

The structural model was evaluated using process Macro bootstrapping with 5,000 resamples (Hayes, 2018), following established guidelines for assessing model quality (Chin, 2010; Hair et al., 2010, 2013; Fernandes, 2012). The analysis considered R^2, effect size (f^2), predictive relevance (Q^2), and goodness of fit (GoF), with path coefficients tested for significance through bootstrapping. Results indicated that TL accounted for 31.7% of the variance in EO, while TL and EO jointly explained 31.4% of the variance in SP, both surpassing Cohen's (1988) threshold for substantial explanatory power. Predictive relevance was confirmed through positive Q^2 values for EO and SP, demonstrating adequate model capability. Effect size analysis revealed that TL exerted a large effect on EO ($f^2 = 0.464$) but only a small effect on SP ($f^2 = 0.039$), whereas EO had a medium effect on SP ($f^2 = 0.178$), underscoring its mediating role in the model (See table 14 and 15).

Table 14 R2, Q2 result

Variable	R-square	Q²predict
EO	0.317	0.301
SP	0.314	0.171

Table 15 F2 result.

Variable	EO	SP
EO		0.178
TL	0.464	0.039
SP		

Goodness of Fit (GoF)

The overall model fit was evaluated using the GoF index, which combines measurement and structural model performance (Tenenhaus et al., 2005). The GoF values exceeded the recommended threshold of 0.36 for large effect sizes, indicating that the model demonstrates strong explanatory power and overall fit.

Hypotheses Testing

After validating the measurement and structural models, the final step was to test the proposed hypotheses using PLS-SEM with bootstrapping (5,000 resamples) in SmartPLS 4.1.0.9. The analysis was structured into three parts: (1) testing the three main direct hypotheses, (2) testing the sub-hypotheses of the second, and (3) conducting mediation analysis for the fourth main hypothesis and its sub-hypotheses.

Testing the First Three Main Direct Impact Hypotheses

The results of hypothesis testing provide strong support for the first three direct impact relationships within the model. TL was found to exert a significant positive influence on SP of manufacturing SMEs (β = 0.199, t = 2.084, p < 0.05), thereby confirming H1. TL also demonstrated a robust effect on EO (β = 0.563, t = 10.862, p < 0.001), offering strong support for H2. Finally, EO significantly enhanced SP (β = 0.423, t = 5.710, p < 0.001), validating H3. Collectively, these findings underscore the pivotal role of TL in shaping EO and SP, while highlighting EO's direct contribution to SP outcomes see Table 16 and Figure 4.

Table 16. Results of Direct Relationship Impacts

Path	B	SD	T value	P value	Confidence interval		Decision
					BCI LL	BCI UL	
TL→SP	0.199	0.095	2.084	0.037	0.003	0.380	supported
TL→EO	0.563	0.052	10.862	0.000	0.465	0.668	Supported
EO→SP	0.423	0.095	5.710	0.000	0.282	0.573	Supported

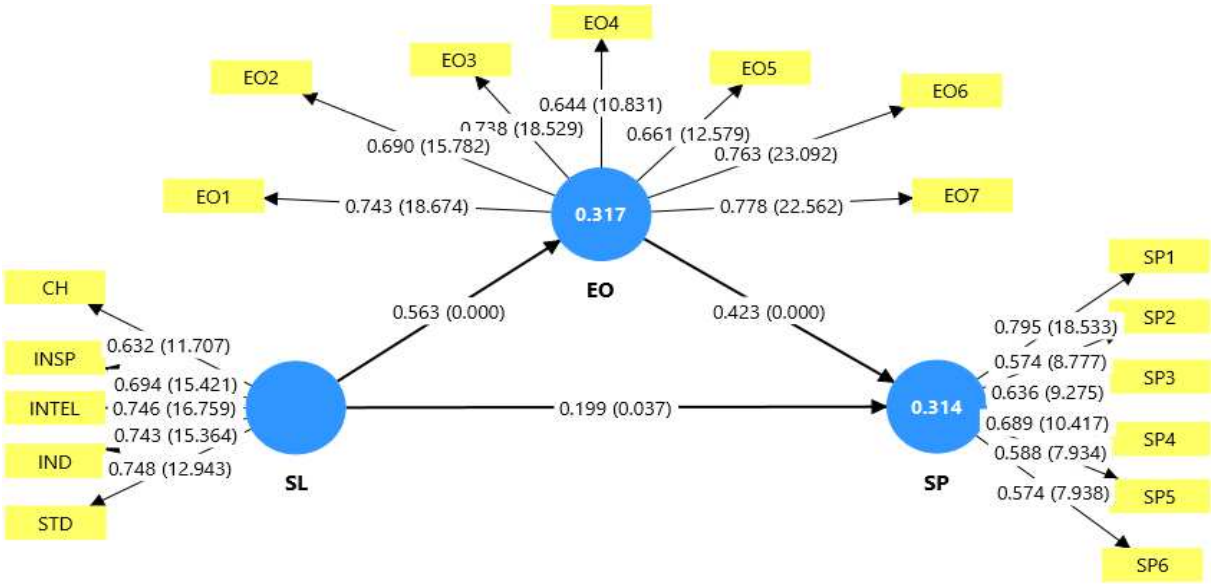


Figure 4: Casual Correlation between Second-order Constructs

Hypotheses Testing – Sub-Hypotheses of the TL–EO Relationship

The effects of individual TL dimensions varied in significance. Charisma did not exert a statistically significant impact on EO (β = 0.110, t = 1.882, p > 0.05), leading to the rejection of H2a. In contrast, Inspirational Motivation had a strong positive effect (β = 0.247, t = 3.334, p < 0.001), supporting H2b. Intellectual Stimulation also significantly influenced EO (β = 0.168, t = 2.233, p < 0.05), confirming H2c. Individualized Consideration showed no significant effect (β = 0.094, t = 1.327, p > 0.05), thus H2d was not supported. Finally, Strategic Direction demonstrated a significant positive impact (β = 0.182, t = 2.485, p < 0.05), supporting H2e. Collectively, these findings highlight that while certain TL dimensions—particularly Inspirational Motivation, Intellectual Stimulation, and Strategic Direction—play a pivotal role in fostering EO, others such as Charisma and Individualized Consideration do not exhibit significant influence see Table 17 and Figure 5.

Table 17. Results of Direct Relationship Impacts of LOCs of TL and HOC of EO

Hypotheses	B	SD	T value	P values	Confidence interval		Decision
					BCI LL	BCI UL	
CH → EO	0.110	0.058	1.882	0.064	-0.002	0.225	Not supported
INSP→EO	0.247	0.074	3.334	0.001	0.103	0.389	Supported
INTELL→EO	0.168	0.074	2.233	0.024	0.020	0.307	Supported
INDV→EO	0.094	0.071	1.327	0.108	-0.041	0.238	Not Supported
STD→EO	0.182	0.070	2.485	0.012	0.046	0.322	Supported

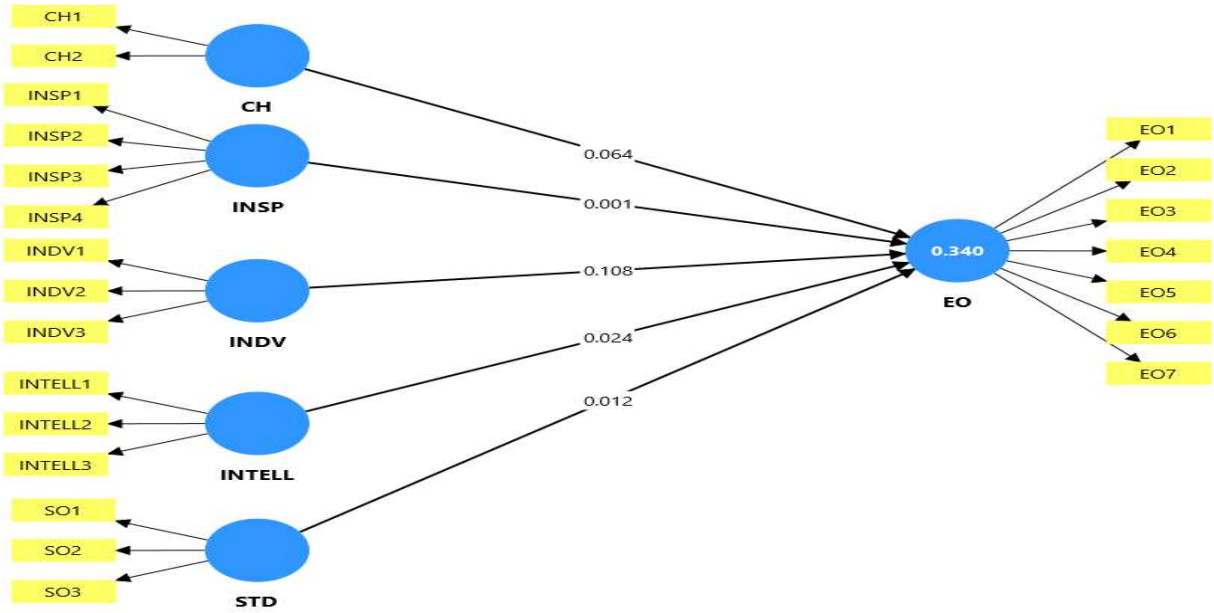


Figure 5 Impact of TL dimensions on EO

Mediation Analysis

The fourth main hypothesis was tested to examine the mediating role of EO between TL and SP , following the mediation procedure outlined by Zhao et al. (2010). Results (Table 4.40, Figure 4.8) demonstrated that the total effect of TL on SP was significant (β = 0.437, t = 5.626, p < 0.001). When EO was introduced as a mediator, the direct effect of TL on SP remained significant (β = 0.199, t = 2.084, p < 0.05), while the specific indirect effect through EO was also significant (β = 0.238, t = 5.589, p < 0.001). The presence of both significant direct and indirect effects indicates complementary partial mediation, confirming that EO transmits part of TL's influence on SP while TL continues to exert a direct effect. This finding underscores EO's pivotal mediating role in strengthening the TL–SP relationship (see Table 18 and Figure 6).

Table 18 Mediation Analysis of EO between the TL and the SP

Total effect TL->SP		Direct effect TL->SP		Indirect effet						
cofffecient	P value	cofffecient	P value	Path	B	STDEV	T value	P value	Confidence interval	Decision
									BCILL BCIUL	
0.437	0.001	0.199	0.037	H4:TL->EO->SP	0.238	0.043	5.589	0.000	0.165 0.336	Supported

Note: STD = Standard deviation; TL = Transformational Leadership; EO = Entrepreneurial Orientation; SP Sustainable Performance

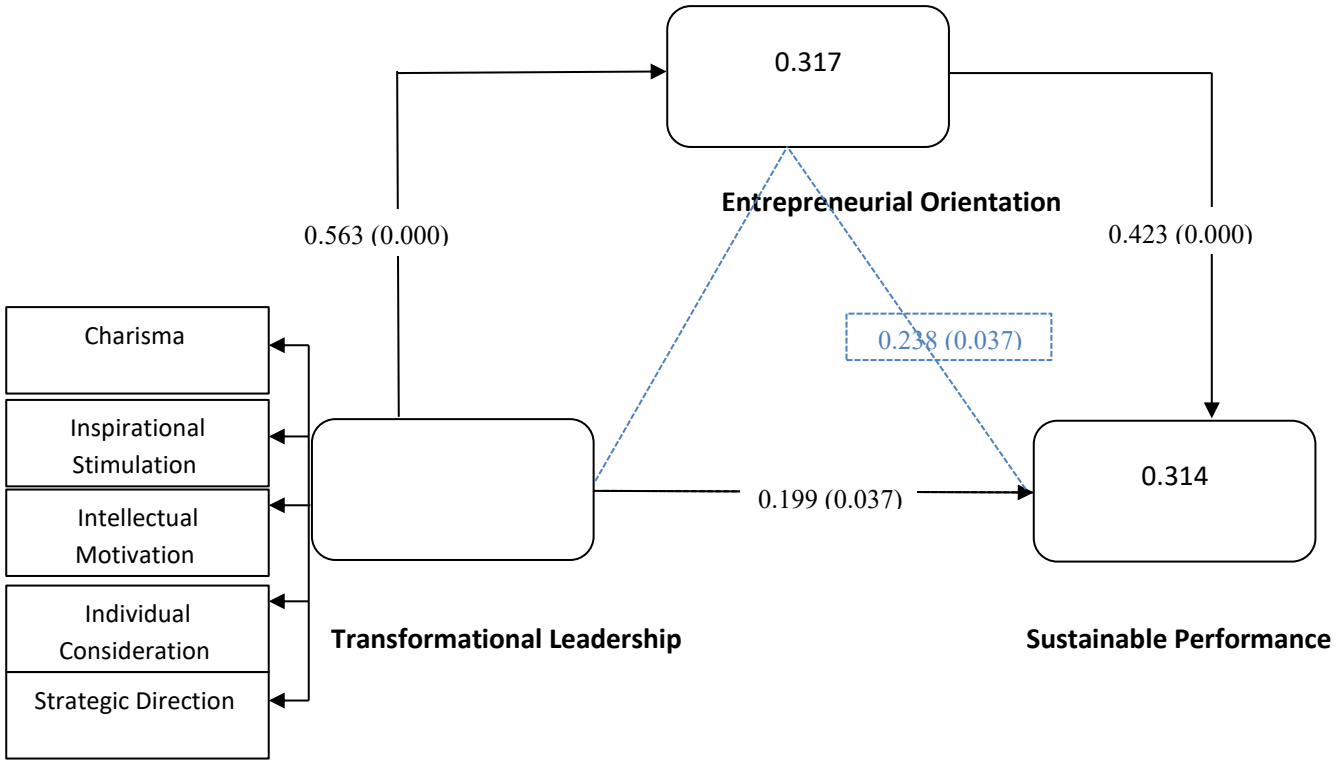


Figure 6: mediating analysis of EO between TL and SP.

Discussion

The Impact of new Transformational leadership model on Sustainable Performance of Manufacturing SMEs.

The findings of this study confirm H1, showing TL significantly enhances SP among Yemeni manufacturing SMEs. This result is consistent with prior research (Sapta et al., 2021; Widisatria & Nawangsari, 2021; Bhatti et al., 2023; Lin et al., 2022), which demonstrates that TL—particularly when aligned with environmental and responsible leadership practices—positively influences the triple-bottom-line (economic, social, and environmental performance). Empirical evidence highlights TL's role in fostering green innovation, organizational citizenship behavior (OCB), and pro-environmental practices, which collectively strengthen SP (Jiang et al., 2017; Farrukh et al., 2022; Sun et al., 2022). By inspiring employees and embedding sustainability into organizational culture, TL enhances CSR initiatives and financial outcomes (Ahsan, 2024). Leaders who emphasize environmental responsibility also stimulate creativity, intellectual engagement, and green capabilities, enabling SMEs to balance growth with ecological responsibility (Shafi et al., 2020; Bhatti et al., 2024).

The addition of the Strategic Direction dimension in this study further underscores TL's ability to integrate sustainability into long-term organizational strategies. As leaders who articulate clear strategic visions not only improve environmental performance but also strengthen economic and social outcomes (Aragon et al., 2008; Zhang & Wei, 2021). Charismatic and visionary leadership, as intangible resources, influence stakeholders to prioritize sustainability, thereby enhancing firm competitiveness (Conger & Kanungo, 1987; Hart, 1995).

These findings align with studies across diverse contexts, including lean manufacturing (Burawat, 2019; Zhao & Huang, 2022), green innovation in SMEs (Pham et al., 2023; Farhan & Nawaz, 2022), and organizational learning (Begum et al., 2020; Adhiatma et al., 2023). Collectively, the evidence affirms that TL directly and indirectly drives SMEs'

innovation, environmental responsibility, and sustainable performance. TL—particularly through inspirational motivation, intellectual stimulation, individualized consideration, and strategic direction—acts as a catalyst for SMEs to achieve sustainable performance by embedding environmental, social, and economic goals into organizational practices.

In Yemen's fragile and resource-constrained environment, TL plays a pivotal role in shaping SP. Managers and SME owners adopt TL to guide employees toward sustainability, particularly in contexts where efficiency in energy use, resource management, recycling, and employee welfare is critical for survival and long-term performance.

While this study confirms a significant positive relationship between TL and SP, the literature presents mixed findings. Some studies report differential or even insignificant impacts across SP dimensions. For example, Waldman and Siegel (2004) emphasized intellectual stimulation as central to sustainability strategy, whereas Al-Dhobee et al. (2025c) highlighted individualized consideration as most effective for environmental performance. Robertson and Barling (2017) distinguished between environmentally specific and general TL, showing both are related but empirically distinct. Ren et al. (2024) further demonstrated that meeting individual employee needs enhances engagement and pro-environmental behavior.

Despite these variations, the majority of studies—including Pham et al. (2023), Hanif et al. (2023), Bhatti et al. (2023), Lin et al. (2022), and Sapta et al. (2021)—support the positive impact of TL on sustainability outcomes. However, contrasting evidence exists: Tosun et al. (2022) found green TL influenced green performance only indirectly through CSR, while Younis and Hussain (2023) reported no moderating effect of green TL on the relationship between green HRM and psychological green climate.

From a theoretical perspective, TL's impact on SP in Yemen can be explained through multiple lenses: 1)Social Learning Theory (SLT): Employees imitate leaders' strategic competencies, charisma, and moral integrity, enhancing sustainable behaviors; 2)Resource-Based View (RBV): Leaders' capabilities act as intangible resources that strengthen firms' sustainability strategies;3) Dynamic Capabilities Theory (DCT): TL enables firms to reconfigure and adapt resources in constrained environments to achieve SP and 4) Upper Echelons Theory (UET): Leaders' knowledge, values, and experiences shape organizational strategies and sustainability outcomes.

Thus, TL dimensions—charisma, inspirational motivation, intellectual stimulation, individualized consideration, and strategic direction—collectively form a mechanism for advancing SP in resource-constrained contexts. Leaders inspire employees with a compelling vision, stimulate innovative problem-solving, and redirect firms toward sustainable outcomes despite structural challenges.

The impact of new Transformational leadership model and it is dimensions on the Entrepreneurial Orientation of manufacturing SMEs.

The result of the study shows that TL significantly EO among Yemeni manufacturing SMEs. This relationship is particularly important in fragile and resource-constrained environments, where EO—defined by innovativeness, proactiveness, and risk-taking—serves as a strategic capability for survival and growth.

Empirical evidence supports this conclusion. Pittino et al. (2017) demonstrated that EO emerges under varying leadership contexts shaped by motivations, personality traits, and organizational environments. Obeidat et al. (2018) further emphasized the role of inspirational motivation and intellectual stimulation in promoting EO. Together, these studies highlight TL's ability to foster entrepreneurial behaviors within SMEs.

From a theoretical perspective, the positive impact of TL on EO can be explained through several frameworks. RBV suggests that TL provides intangible resources such as charisma, vision, and strategic direction, which strengthen SMEs' ability to develop EO as a source of competitive advantage. DCT emphasizes that TL enables firms to sense opportunities, seize them through entrepreneurial action, and reconfigure resources to adapt to turbulent environments, thereby fostering EO. SLT explains how employees imitate leaders' entrepreneurial behaviors—such as risk-taking and proactiveness—when leaders model them, reinforcing EO at the organizational level. Finally, UET highlights that leaders' values, knowledge, and cognitive frames shape organizational strategies, meaning TL directly influences the development of EO within SMEs.

In Yemen's unstable environment, SME managers must integrate leadership and entrepreneurial characteristics to navigate structural challenges. TL inspires employees with a compelling vision and fosters commitment, while EO equips firms to seize opportunities and embrace risk-taking behaviors essential for sustainability.

The findings of this study reveal that not all dimensions of TL exert the same influence on EO among Yemeni SMEs. Specifically, Inspirational Motivation (INSP) and Intellectual Stimulation (INTELL) demonstrated significant positive effects on EO. These results are consistent with Obeidat et al. (2018) and Nofal & Jaradat (2020), who identified these dimensions as critical drivers of entrepreneurial behavior. Inspirational motivation enables leaders to articulate a compelling vision, energizing employees to pursue innovation and opportunity, while intellectual stimulation encourages critical thinking and creative problem-solving, which are foundational to EO (Jansen et al., 2009; Wheelen & Hunger, 1992). Bekata and Kero (2025) further support this view, showing that leadership styles emphasizing vision and cognitive stimulation enhance innovation capabilities and EO in SMEs.

Strategic Direction (STD) also significantly influenced EO, underscoring the importance of clarity of purpose and long-term vision in fostering entrepreneurial behavior. This finding aligns with Rust et al. (2004) and O'Regan & Ghobadian (1997), who emphasized that strategic direction enhances organizational alignment and opportunity recognition—key components of EO. More recently, Lusianti et al. (2023) confirmed that strategic vision, particularly when aligned with digitalization and innovation, positively affects EO and sustainable competitive advantage. In volatile markets such as Yemen, strategic clarity enables SMEs to pursue innovation and risk-taking with confidence, reinforcing EO as a strategic capability.

By contrast, Charisma (CH) and Individualized Consideration (INDI) did not significantly affect EO. These results are consistent with Nofal & Jaradat (2020), who also found no significant impact of these dimensions on EO. While charisma and individualized consideration enhance relational dynamics and employee morale, they may not directly stimulate entrepreneurial behaviors such as risk-taking or innovation unless complemented by strategic incentives and autonomy (Al Mamun et al., 2018).

From a theoretical perspective, these findings can be explained through the RBV, which positions inspirational motivation, intellectual stimulation, and strategic direction as intangible resources that strengthen firms' entrepreneurial capabilities. DCT further clarifies that these dimensions enable SMEs to sense opportunities, seize them through proactive

strategies, and reconfigure resources to adapt to turbulent environments. SLT explains how employees imitate leaders' visionary and problem-solving behaviors, reinforcing EO across the organization. Finally, UET highlights that leaders' cognitive frames and values—particularly those expressed through strategic direction and intellectual stimulation—shape organizational strategies, thereby embedding EO into firm culture.

Entrepreneurial Orientation and Sustainable Performance

The findings of this study confirm H3, showing that EO significantly enhances SP among Yemeni manufacturing SMEs. EO, as a form of entrepreneurial behavior, is crucial because it fosters innovation, adaptability, and risk-taking—capabilities that enable firms to remain competitive and resilient in unstable environments. By integrating innovativeness, proactiveness, and risk-taking into a unidimensional construct, this study demonstrates that EO positively influences both economic and environmental outcomes, thereby supporting SP.

This result is consistent with prior empirical studies. Renko et al. (2015) emphasized EO's role in recognizing individual value in the entrepreneurial process and driving sustainability. Abid et al. (2023), and Shakil et al. (2024) confirmed EO as a key driver of SP in SMEs. Jiang et al. (2018) and Habib et al. (2020) found that green EO enhances both financial and environmental performance, while Farhan and Nawaz (2022), Wei and Duan (2023), and Zhang et al. (2023) highlighted EO's contribution to eco-friendly innovation and competitiveness. Although some studies report mixed results—such as Riwu Kore et al. (2024) and Gali et al. (2020), who identified indirect or negative effects on certain sustainability dimensions—the overall evidence supports EO as a critical enabler of long-term sustainability.

From a theoretical perspective, EO's impact on SP can be explained through several frameworks. RBV positions EO as a valuable intangible resource that strengthens SMEs' competitive advantage by embedding innovation and adaptability into organizational routines. DCT highlights EO's role in enabling firms to sense opportunities, seize them through proactive strategies, and reconfigure resources to meet sustainability challenges. SLT suggests that employees imitate entrepreneurial behaviors modeled by leaders, reinforcing innovativeness and risk-taking across the organization. Finally, UET emphasizes that

leaders' values and cognitive frames shape EO, which in turn drives sustainability-oriented strategies and outcomes.

In Yemen's resource-constrained environment, EO allows SMEs to transition from short-term profit-maximization toward long-term sustainability. Innovativeness supports eco-friendly manufacturing processes and sustainable product development, proactiveness enables responsiveness to shifting consumer preferences, and risk-taking fosters green innovation and market expansion. Moreover, environmental performance enhances economic performance by meeting growing demand for eco-friendly products, reducing costs, and improving public health outcomes.

Conclusion: EO significantly contributes to SP by embedding innovation, proactiveness, and risk-taking into SMEs' strategies, enabling them to achieve economic, social, and environmental goals simultaneously. By linking EO to SP through RBV, DCT, SLT, and UET, this study demonstrates that EO is not only a behavioral construct but also a strategic capability that drives sustainability in fragile economies.

The mediating role of Entrepreneurial Orientation between Transformational Leadership and Sustainable Performance of SMEs

The findings of this study confirm H4, showing that EO plays a significant partial mediating role in the relationship between TL and SP among Yemeni manufacturing SMEs. This result addresses a critical gap in the literature, where prior studies have reported inconsistencies in the direct TL–SP linkage. By introducing EO as a mediating mechanism, this study provides explanatory depth, demonstrating how leadership strategies are translated into sustainable outcomes through entrepreneurial behaviors.

The literature has long suggested that leadership alone may not be sufficient to drive sustainability. For example, Nor-Aishah et al. (2020) found mixed effects of leadership on SP, while Burawat (2019) and Zhao & Huang (2022) highlighted differences across TL dimensions and industry contexts. These inconsistencies prompted calls for more complex models that incorporate additional variables such as EO (Fatoki, 2019; Ameer & Khan, 2020). By embedding EO into the TL–SP dynamic, this study responds directly to these calls, showing that EO functions as a bridge between leadership intentions and tangible sustainability outcomes.

From a theoretical standpoint, EO's mediating role is well explained by several frameworks. RBV positions EO as an intangible resource—comprising innovativeness, proactiveness, and risk-taking—that strengthens firms' ability to achieve competitive and sustainable outcomes. DCT emphasizes EO's role in enabling firms to sense opportunities, seize them through entrepreneurial action, and reconfigure resources to adapt to turbulent environments, thereby translating TL into SP. SLT explains how employees imitate entrepreneurial behaviors modeled by transformational leaders, reinforcing EO as a collective organizational capability. UET highlights that leaders' values and cognitive frames shape EO, which in turn channels leadership vision into sustainability-oriented strategies.

Empirical evidence further supports EO's mediating role. Fatoki (2019) showed that sustainable EO enhances innovativeness and risk-taking, leading to improved SP. Mullens (2018) found EO positively related to investments in sustainability initiatives, while Ameer and Khan (2020) confirmed EO's impact on economic, social, and environmental performance in emerging economies. Studies such as Al Mamun et al. (2018) and Hidayat et al. (2021) demonstrated EO's mediating role in performance linkages across SMEs and start-ups, reinforcing its versatility. Moreover, Yacob et al. (2021) showed EO amplifies other strategic inputs, such as e-commerce adoption, indirectly elevating SP.

In fragile contexts like Yemen, TL without EO may lack the agility or risk appetite to navigate dynamic market environments. EO provides the necessary entrepreneurial competencies to complement leadership vision, ensuring that sustainability strategies are not only articulated but also implemented effectively.

Conclusion: EO serves as a functional bridge connecting TL to SP, offering both theoretical and empirical support for its mediating role. By positioning EO as a strategic conduit, this study demonstrates that leadership effectiveness in SMEs is contingent on entrepreneurial capabilities. This finding addresses the first research question and fulfills the first objective of the study, contributing to both theory and practice by clarifying how TL translates into sustainable outcomes through EO.

Contribution of the Study

This study makes several important contributions to both theory and practice.

Theoretical Contributions:

The research advances the understanding of how TL influences SP through the mediating role of EO. By integrating multiple theoretical perspectives—RBV, DCT, SLT, and UET—the study provides a comprehensive framework that explains how leadership behaviors translate into entrepreneurial capabilities and, ultimately, sustainable outcomes. It contributes to the literature by clarifying inconsistencies in prior studies regarding the TL–SP relationship, demonstrating that EO serves as a critical mechanism that bridges leadership vision with tangible sustainability results. Additionally, the study enriches the discourse on TL by introducing Strategic Direction as a new dimension, showing its significant role in fostering EO and sustainability. This extension of TL theory offers a more nuanced understanding of leadership in resource-constrained contexts.

Practical Contributions:

For practitioners, the study provides actionable insights for SME managers and owners, particularly in fragile economies such as Yemen. It highlights that TL dimensions—especially inspirational motivation, intellectual stimulation, and strategic direction—are essential for cultivating EO, which in turn drives SP. The findings suggest that SMEs should invest in leadership development programs that emphasize vision communication, cognitive stimulation, and strategic clarity to foster entrepreneurial behaviors among employees. Practically, the study shows that EO enables SMEs to balance economic, social, and environmental goals, even under severe resource constraints. By adopting EO-driven strategies, SMEs can enhance innovation, respond proactively to market changes, and embrace risk-taking behaviors that support long-term sustainability.

Limitations and future research directions

The study has many limitations. First, it is conducted in some manufacturing small and medium enterprises in a limited number of manufacturing fields. Including other manufacturing fields with increasing the sampling with a larger sample and a multi-group analysis across the whole country may expedite the generalizability of results to compare and comprehend the mediating role of EO between TL and SP in SMEs. Selections of other fields such as large manufacturing firms or servicing firms' sector are needed too. Second, it is important to replicate this study in other circumstance than the current circumstance in Yemen through which a lot of SMEs firms were closed in Yemen as a result of war. Third, it is encouraged to replicate the study in other cultures of developing countries to validate the findings' generalizability. Forth, the indirect relationship among TL and SP should be investigated further through some other mediators and indicators of EO such as autonomy as

it is still unclear specifically in SMEs. Furthermore, future studies shall also assess the impact of different styles of SL on SP of SME.

Data availability

Data will be available open reasonable request by contacting the corresponding author.

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Author Contributions Statement

Dr.Y.A.: Conceptualization, Methodology, Investigation, Data Curation, Formal Analysis, Validation, Project Administration, Supervision, Writing – Original Draft Preparation, Writing – Review & Editing, Figures, Visualization, and Corresponding Author.

D.S.A.: Conceptualization, Literature Review, Tables, Validation, and Writing – Review & Editing..

Consent to Participate

Informed consent was obtained from all individual participants involved in the study. Participants were assured of confidentiality, and no personal identifiers such as names or titles were included in the questionnaires.

Ethics declarations

Ethics approval

This study received formal approval from the Ethical Research Committee and the Academic Committee of the Center for Business Administration ,Sana'a University. All research procedures were conducted in accordance with established ethical guidelines and institutional requirements of Sana'a university and with the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards.

Consent for publication

Not applicable

Competing interests

The authors declare no competing interests.

Clinical trial number

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