



# Managers' leadership competencies and sustainable development goals in turbulent markets: the enabling role of resource commitment

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## Abstract

Research on the sustainable development goals (SDGs) has brought attention to the significance of small and medium enterprises (SMEs) due to their substantial contributions to economic growth. However, SMEs still need to develop integrated frameworks to assess the implications of sustainable operations while managing scarce resources. In this study, we investigate how top managers of SMEs utilize leadership competencies to balance and allocate resources for SDGs in a turbulent environment. To test the model, the analysis was conducted on 254 SMEs operating in an emerging market. The findings indicate that resource commitment plays a partially mediating role between leadership competencies and SDGs, while environmental uncertainty does not moderate the relationship between leadership competencies and resource commitment. These insights suggest that SMEs with competent leaders commit resources to SDGs regardless of environmental conditions. This research recommends that SMEs focus on cultivating competent leaders to navigate resource constraints and contribute to the SDGs in a turbulent environment. Further implications are discussed.

**Keywords** Corporate social responsibility · Sustainability · Sustainable development · Small business

## Introduction

The sustainable development goals (SDGs), announced by the United Nations in 2015, have gained increasing prominence in the global economy. Since their introduction, economies around the world have been developing integrated frameworks and strategies to attain the SDGs (Khattak 2020; Küçükgül et al. 2022). small and medium

enterprises (SMEs) located in emerging economies, in particular, have grasped the attention in this scenario (Khattak 2020; Smith et al. 2022). SMEs are distinguished from larger enterprises by their smaller size, limited resource availability, flexible organizational structures, and reliance on informal strategies (Terziovski 2010). On the one hand, SMEs are appreciated for their contributions to employment, GDP, and economic growth (Anwar and Li 2021). However, on the other hand, the top managers of these businesses are criticized for their lack of participation in sustainable practices and cleaner production (Ilyas et al. 2020). Prior literature has cited poor support (Ying et al. 2019), financial constraints (Chiappini et al. 2022), lack of digital resources (Anwar et al. 2022), and poor management competencies (Yu et al. 2015) as major constraints to SMEs in sustainable activities. It is argued that manufacturing SMEs create 64% of the air pollution in Europe, while only 0.4% of these firms have frameworks for sustainable policies (Bonner 2019). Hence, there is a great need for building sustainable policies in SMEs to cope with environmental issues (Tyler et al. 2023). SMEs need to build an integrated policy framework, taking into account individual and organizational-level activities for sustainable practices (DiBella et al. 2023). Despite the

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substantial increase in research on the determinants of sustainable practices in SMEs, there is limited evidence available on how top managers of SMEs manage limited resources in uncertain environments to achieve sustainable performance. However, some studies have argued that SMEs tend to engage in environmental and social activities (e.g. Khan et al. 2021; Khattak 2020; Parrilli et al. 2023; Smith et al. 2022; Tyler et al. 2023). While there is still ambiguity regarding how leadership competencies of top managers enable SMEs to address resource scarcity and adopt sustainable practices in a turbulent environment, we aim to fill this gap by examining the role of leadership competencies within SMEs concerning SDGs, with a focus on resource commitment under conditions of environmental uncertainty. The objectives of this study are as follows: (a) to explore the impact of managers' leadership competence on SDGs; (b) to investigate the mediating effect of resource commitment between leadership competencies and SDGs; and (c) to assess how environmental uncertainty moderates the relationship between leadership competencies and resource commitment.

Literature indicates a high degree of heterogeneity in SMEs, making them distinguishable from each other. For instance, Ying et al. (2019) argue if the top management team of SMEs has intangible capabilities, they will acquire external resources easily for sustainable competitive performance. Similarly, Ullah et al. (2021) revealed that the internal managerial competencies of SMEs facilitate them in innovating their business model for substantial growth. Managers fortify high levels of leadership competencies yield desirable outcomes and high performance (Trivellas and Reklitis 2014). Managerial competencies (e.g. embracing diversity and interdisciplinary) play a significant role in CSR (Wesselink et al. 2015). SMEs with leadership competencies have better sustainable performance in the markets (Suriyankietkaew et al. 2022). However, when considering small businesses, it becomes crucial to balance resources for sustainable activities in the face of resource scarcity. This becomes achievable when top managers possess specific leadership competencies. On the other hand, the external environment has a significant impact on small businesses (Nasiri et al. 2022) and pushes them to restructure their strategies and resources for better practices. Managers of SMEs should take care of environmental uncertainty while managing resources for operational activities (Chen and Tian 2022). Environmental uncertainty creates alertness among businesses to commit resources for SDGs (Bei and Wang 2023). The environment in Pakistan is highly turbulent and volatile (Anwar et al. 2022), which drives firms, and in particular small businesses to manage their resources efficiently and effectively for better practices (Khattak and Ullah 2021). However, it is still understudied how environmental uncertainty moderates the relationship between leadership

competencies and resource commitment in small businesses. Hence, assessing the role of environmental uncertainty is vital for sustainable practices in small business industries.

This research enriches the existing body of knowledge and contributes to the literature in three ways. First, it examines environmental uncertainty as a moderator and resource commitment as a mediator between leadership competencies and SDGs. Although previous studies have explored the relationship between sustainability and top management characteristics in small businesses (Disli et al. 2022; Khattak et al. 2023; Maqbool and Amaechi 2022). However, this research delves deeply into the assessment of all 17 SDGs in their interaction with leadership competencies and resource commitment within an uncertain environment. Second, there has been limited discussion on SDGs among SMEs operating in emerging economies, and this area of research is indeed in great need of attention. Our research enriches the literature with novel empirical evidence collected from SMEs operating in an emerging market. We utilized a survey data approach, which is recommended for small business industries (Ilyas et al. 2020; Khattak et al. 2023; Ullah et al. 2021) due to the absence of secondary data. Moreover, it is easier to survey a large number of businesses with this approach as compared to qualitative or in-depth interview. The third contribution of this research spurs our knowledge of the upper echelon theory (Hambrick and Mason 1984). For instance, the theory has been widely tested in strategic management literature (Ali et al. 2022; Anwar et al. 2018b; Ilyas et al. 2020; Khattak et al. 2023). However, we have initiated a new discussion by integrating leadership competencies with SDGs, resources, and an uncertain environment. In particular, we extend this theory by examining the interaction between leadership competencies and environmental uncertainty in the context of SDGs to demonstrate the central role that leadership plays in highly turbulent environments.

The insights gained from this research are valuable for the small business industry and policymakers alike. Recognizing that SMEs face significant challenges due to resource constraints in dynamic markets, leadership skills enable small businesses to effectively manage and leverage their existing resources for sustainable practices. Our research reveals that leadership competence is crucial for effectively balancing resources to support sustainable practices. Nevertheless, there is mounting pressure from stakeholders and the public on business industries to implement sustainable strategies. In this scenario, top management leadership is considered responsible for managing resources to achieve SDGs (Kiesner and Baumgartner 2020). In this scenario, SMEs can comprehend the power of leadership in managing resources for SDGs in turbulent environments. The insights from this research assist top managers in finding solutions to cope with limited yet valuable resources in competitive

markets. Our research reveals that SMEs with leadership competencies exhibit strong responses in uncertain environments. For instance, when the environment is highly uncertain, SMEs with leadership competencies effectively balance their resources for SDGs. In other words, environmental uncertainty poses no threat to SMEs that possess leadership competencies. Based on the insights of this research, top management in SMEs can formulate sustainable policy structures to address resource shortages, develop leadership skills, and manage unexpected crises. Governments and public authorities are also encouraged to allocate sufficient resources to support sustainable activities in small business industries.

## Theoretical background

### SMEs and SDGs

The SDGs, encompass seventeen goals (given below), have received significant attention since their announcement in 2015. Countries have realized that companies, and in particular SMEs, have unique strengths to bring to the pursuit of the SDGs (Smith et al. 2022). SMEs hold more than 95% of worldwide businesses (Zheng et al. 2022), contribute more than 40% of GDP (Anwar 2018), and play a key role in employment (Shah et al. 2021). It makes their role prominent in the SDGs in the private sector.

Particularly in emerging economies, SMEs have potential and tend to be strongly rooted in communities because of their strong relationships, interactions, and engagement with local people (Jamali et al. 2017). Meanwhile, small businesses in emerging economies face countless challenges such as limited resources, lack of support, and poor frameworks to deal sustainable practices (Anwar and Li 2021; Khan et al. 2021; Khattak 2020). However, these businesses have high entrepreneurial potentials and therefore prefer to adopt environmental practices in the face of such obstacles (Tyler et al. 2023). Their managerial dynamic power and support play a key role in practicing SDGs (Ilyas et al. 2020; Smith et al. 2022). In contrast, many SMEs in Pakistan fail to contribute to SDGs due resource scarcity and lack of managerial commitment (Naveed et al. 2022). Top management team of SMEs try to build partnership (Castellani et al. 2023), manage, and acquire resources (Khattak 2020) to gain SDGs. Hence, we argue that top managers of SMEs must have the abilities to balance their existing resources for SDGs in the dynamic environment.

The seventeen SDGs are below:

- No poverty
- Zero hunger
- Good health and well-being

- Quality education
- Gender equality
- Clean water and sanitation
- Affordable and clean energy
- Decent work and economic growth
- Industry, innovation, and infrastructure
- Reduced inequalities
- Sustainable cities and economies
- Responsible consumption and production
- Climate action
- Life below water
- Life on land
- Peace, justice, and strong institutions
- Partnership for the goals

### Upper echelon theory

The proposed model in this research is based on managerial leadership competencies, resource commitment, and SDGs within the context of environmental uncertainty. This research places a spotlight on managerial characteristics, drawing upon the upper echelon theory (Hambrick and Mason 1984) as the foundational theory. The upper echelon theory considers managerial psychological attributes (such as personality, emotions, and behaviors) and demographic factors (like age, education, leadership skills, and experience) as key determinants of organizational outcomes. This theory portrays managers as individuals responsible for shaping organizational results. Managers encounter numerous challenges and complex tasks, and their values and beliefs play a significant role in making strategic decisions. For instance, a CEO formulates strategies and assumes responsibility for an organization's social activities (Waldman et al. 2006). Therefore, executives and top management teams consciously balance the resources for better outcomes. The upper echelon demonstrates that positive outcomes and consequences are the key responsibilities of the top management team. For instance, Ying et al. (2019) revealed that manager's intangible competencies enable SMEs in acquiring external resources for sustainable performance. These attributes enable small businesses to innovate their business and participate in global business (Shah et al. 2021), and SDGs.

Applying the upper echelon theory, recent studies (e.g. Huo et al. 2021; Wu et al. 2015) note that manager leadership competencies significantly influence CSR and sustainable practices in business organizations. We argue that manager leadership competence helps SMEs in balancing their resources for SDGs in an ambiguous environment. Our research enriches the knowledge and literature on the upper echelon theory under the umbrella of resource commitment, SDGs, and environment uncertainty in emerging SMEs.

## Literature review and hypotheses

### Leadership competencies and SDGs

Managerial leadership competencies are now becoming an integral part of various activities (Hesselbarth and Schaltegger 2014). Firms with leadership competencies have a higher level of sustainable performance (Pham and Kim 2019). Competencies spur sustainable development (Lambrechts et al. 2013), improve circular economy (Soni et al. 2023), and contribute to green innovation (Pham et al. 2023). Managers with leadership competencies have efficient sustainability frameworks (Metcalf and Benn 2013). Leadership competencies assist businesses in sustainable activities and motivate them to adopt sustainable framework (Álvarez-García et al. 2022). Experienced and competent leaders empower sustainable activities in SMEs in emerging economies (Khattak et al. 2023). Competencies and capabilities play a robust role in configuring sustainable organization performance (Somwethee et al. 2023). Indeed, leadership support and abilities are important for sustainable development in worldwide economies (Högfeldt et al. 2023).

Meng et al. (2015) revealed that managerial leadership competencies is the main driver of infrastructure sustainability. Similarly, Tabassi et al. (2016) also endorsed that leadership competencies facilitate project managers in sustainable constructions. Leaders solve problems that are confronted in the way to sustainability in organizations (Metcalf and Benn 2013). Leadership styles positively influence environmental and sustainable practices in business firms (Changar and Atan 2021). A recent study conducted by Ur Rehman et al. (2023) reveals that leadership capabilities directly and indirectly contribute to the environmental performance of firms. Therefore, we propose;

*H1. Managers with leadership competencies contribute to SDGs in SMEs*

### Resource commitment as a mediator

One of the major roles of managers is to balance and organize resources for operational activities. Wastage or ineffective use of resources can cause loss and negative performance (Khattak and Ullah 2021). Therefore, managers should carefully manage and balance the resources for better outcomes. According to the upper echelon theory (Hambrick and Mason 1984), leaders and top management teams are the responsible persons for organizations' outcomes and sustainable performance. They manage resources in an effective way to get positive outcomes. Moreover, Kim and Thapa (2018) stated that leaders are

answerable for sustainability, CSR, and social activities in an organization. However, it is noted that not all the leadership styles configure CSR and sustainability practices (Alonso-Almeida et al. 2017). Hence, businesses should focus on competent and skilled leaders who have the ability to acquire, manage, organize, and utilize resources effectively. Particularly in SMEs, top managers and leadership teams have challenges to balance, manage, and organize resources for social activities (Anwar et al. 2018a; Khattak and Ullah 2021).

As Metcalf and Benn (2013) describe, leaders solve problems, think about future events, predict flexibility, and organize and manage resources for sustainability and social activities in organizations. Leaders encourage employees to participate in CSR, communicate with departments to manage the resources and time for better outcomes of CSR (Chen and Hung-Baesecke 2014). Green practices are necessary for the current era, and organizations easily adopt green innovation strategies when they have competent leaders (Dai et al. 2022). Indeed an efficient use of resources is an essential task of top management team to contribute to the community and environment (Anwar et al. 2020). However, this is possible when managers have certain abilities to manage, balance, and organize the resources. Small businesses face resource constraints (Ullah et al. 2021) that yield lower participation in CSR. However, certain businesses use competent managers and leadership to cope with the matters to adopt green practices. As Ying et al. (2019) scrutinize, SMEs with managerial capabilities easily access to external resources for sustainable performance. Hence, we argue that leadership competencies facilitate resource commitment that positively influence SDGs. We propose;

*H2. Managers with leadership competencies effectively commit resources for SDGs in SMEs*

*H3. Resource commitment positively mediates the path between manager leadership competencies and SDGs*

### Environmental uncertainty as a moderator

An uncertain and unpredictable environment is a big challenge for the top management team and leadership. When top managers predict high uncertainty, they pay more attention to their strategic framework. As Moreira et al. (2022) pointed out, if managers want to configure socio-environment and sustainability practices, they must deal with environmental uncertainty. In a highly uncertain environment, firms with transformational abilities perform better than others in sustainable activities (Aray et al. 2021). Highly uncertain environments strengthen the path between leadership competencies and sustainability performance in business ventures (Ogaga et al. 2023). Hence, top managers of SMEs pay attention to environmental changes to adjust their environmental activities. If top managers have no knowledge



and do not care environmental changes, they might lose sustainable performance (Veršič et al. 2022). In contrast, if firms have capabilities and competencies, they effectively respond to external changes and environmental uncertainty (Irwin et al. 2022) and therefore enjoy desirable sustainable performance.

SMEs, due to their smallness and scarce resources, Anwar et al. (2018a) face problems in performing social activities. Hence, top managers of small businesses are more conscious to balance resources for operational activities when the environment goes uncertain. Environmental uncertainty pushes top managers of businesses to manage resources (finance) for SDGs and social activities (Bei and Wang 2023). Waldman et al. (2001) describe that environmental uncertainty significantly moderates the association between leadership and firm performance. York and Venkataraman (2010) further demonstrate that as the environment becomes uncertain and unstable, entrepreneurs try their best to resolve it. Based on these assumptions, we suggest;

*H4. If the environment is highly uncertain, the leadership team of SMEs would be afraid and would likely commit resources (for SDGs)*

Figure 1 illustrates the theoretical framework of the study. Managers' leadership competencies are used as an independent variable, environmental uncertainty is a moderator, resource commitment is a mediator and SDGs as a dependent variable. In addition, there are a few control controls such as managerial attributes (age, education, experience) and firm-level attributes (age, size, and financial performance).

## Methodology

### Research design and data

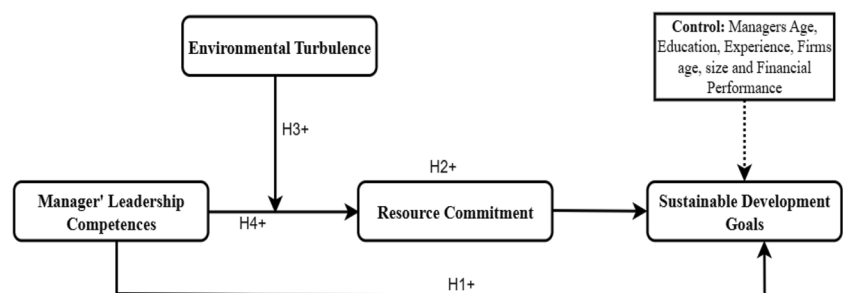
This research adopts a deductive approach, building upon the existing theory of the Upper Echelon (Hambrick and Mason 1984). Consequently, this study follows a quantitative approach to analyze the interactions among managers' leadership competencies, resource commitment, SDGs, and environmental uncertainty.

We employed a convenience sampling technique, focusing on the SME industry in an emerging market. To assess the hypothesized model, we concentrated on collecting data from emerging SMEs. Specifically, we surveyed firms located in major cities, such as Islamabad and Rawalpindi, where top managers typically work in the head offices situated in these cities. We chose to study SMEs for two primary reasons. Firstly, in Pakistan, more than 90% of businesses are SMEs, contributing over 40% to the GDP (Khattak and Shah 2020) and a significant portion to SDGs (Verboven and Vanherck 2016). Surprisingly, these aspects have received limited attention in the sustainable literature. Secondly, while previous studies have assessed various factors, the relationship between leadership competencies, resource commitment for SDGs, and turbulent environments has not been adequately addressed. SMEs, which often face resource scarcity issues, present an opportunity to study the determinants of resource commitment and its impact on SDGs. In our research, we defined firms as SMEs based on the criteria established by the Small and Medium Enterprises Development Authority (SMEDA), which categorizes them as "those firms with fewer than 250 employees."

SMEs often lack proper accounting records and annual reports (Ullah et al. 2021). Hence, we used the survey method as the most suitable source for our research as per the suggestions of the previous studies (Khattak 2020; Shah et al. 2021). We prepared the survey in the English language because it is easily understood by businessmen in Pakistan. However, where necessary, we administered and assisted managers in understanding the concepts and terms used. The survey consisted of two sections. In the first section, we included basic questions regarding the demographic information of the managers (such as age, education, and experience) and firms (including age, industry, size, and performance). The second section contained questions related to the main variables, such as resource commitment and SDGs.

In addition, we included a cover letter to ensure the confidentiality of the data and reduce the likelihood of spurious results. The cover letter clearly stated that the survey should be completed by top management or owners of the firms due to their knowledge, understanding, and role in the business.

**Fig. 1** Framework of the research



To obtain our sample, we accessed a list of registered firms from the websites of relevant Chambers of Commerce in each city. This list included firm names, owner names, locations, contact information, and business types. However, to maximize our response rate, we employed a convenience sampling method. We used two approaches for data collection: a hard copy approach and an online survey. For the online survey, we utilized a Google Docs questionnaire, which we sent to 380 firms. After a reminder, we received a total of 43 responses, resulting in a response rate of 14.3%. For the hard copy approach, we personally visited 500 firms. From this approach, we received 212 usable responses, yielding a response rate of 42.40%. The details of the sampled SMEs are presented in Table 1.

**Table 1** Characteristics of the firms

Particulars	Frequency	Percentage
Firm age		
10 or fewer years	79	31.0
11–20 years	76	29.8
21 years and above	100	39.2
Firm size		
20–50 employees	63	24.7
51–100	32	12.5
101–150	71	27.8
151–200	54	21.2
201–250	35	13.7
Manager education		
Intermediate and below	47	18.4
Bachelor	75	29.4
Master	108	42.4
MS or M.Phil.	25	9.80
PhD etc.	47	18.4
Manager age		
20–30 years	22	8.60
30–40 years	80	31.4
41–50 years	128	50.2
50 years and above	25	9.80
Manager Experience		
5 years or less	13	5.10
6–10 years	45	17.6
11–15 years	117	45.9
16–20 years	80	31.4
Industry		
Trading		
Manufacturing	92	36.1
Services	109	42.7
Total	254	100

## Measures

The items in this study were validated and used in several previous studies. All the items were given in the [appendix](#). Five points Likert scale (strongly disagree 1 to strongly agree 5) was employed for data collection.

### Manager's leadership competencies

It describes the capacity and supremacy to resolve conflicts in an organization, communicate and motivate stakeholders, make appropriate decisions, exploit opportunities, accomplish environmental concerns, and utilize resources in a way to attain objectives and competitive advantage of a firm (Issah et al. 2023). However, leadership competencies shed light on vision, complexity, and challenges that are confronted to top management team in organizations. We adopted the measures from a previous study (Pham and Kim 2019) where a sample item is “inspire followers to go beyond their own interest.”

### Resource commitment

It shows the commitment of top managers to adjust and manage resources for specific activities (e.g., CSR). In particular, it illustrates how managers allocate tangible and intangible resources for business activities to gain organizational objectives. We adopted 4 items from a recent study (Sahoo et al. 2023) to measure resource commitment, and a sample item is “top management in our organization prepares a budget each year and set aside adequate funds to be practically dedicated to environmental management programs.” However, these items were slightly edited to meet the scope of the research.

### Environmental uncertainty

It demonstrates inconsistency in the market in terms of demands, supply, and competition, etc. To measure environmental uncertainty, we used 4 items that validated and used by Haarhaus and Liening (2020). A sample item illustrates “it is not possible to make exact predications about our business segment's development over the next 10 years.”

### SDGs

There are 17 SDGs announced by the United Nations Assembly in 2015. Later these goals were categorized as economic, social, and environmental. However, we used 17 items that cover all the SDGs. These items were adopted from a previous study (Hsu 2023). A sample item describes, “my firm has the ability for responsible consumption and production.”

## Control variables

To diminish the likelihoods of specious results in the sampled data, we controlled managerial demographics (age, education, and experience) and firm-level attributes (age, size, industry, and performance). Based on the results of the structural model, we found that the factors such as manager experience, firm age, and financial performance have a significant influence on SDGs.

## Data analysis and results

We performed SPSS and SmartPLS for screening tests and main analysis respectively. Before we move to the main analysis, we performed several screening tests to improve the validity of our research.

### Screening tests

#### Missing values

Missing values are common in survey data. However, the presence of missing values can cast doubt on the results and analysis. To address this, we conducted a frequency analysis test in SPSS to assess the proportion of missing values. We excluded responses that lacked essential information and did not meet our research requirements. However, responses that had only a few missing data points were retained, as SmartPLS is capable of handling and adjusting for missing values.

#### Descriptive statistics

To determine the variance, mean values, and normality of the data, we used descriptive statistics in SPSS. The descriptive statistics, as shown in Table 2, reveal that manager leadership competencies have the highest mean score, while resource commitment has the lowest mean score. Similarly, environmental uncertainty exhibits the highest standard deviation value, while SDGs display the lowest standard deviation value. The skewness and kurtosis values confirm data normality (with skewness and kurtosis values  $> +/ - 2$ ), as recommended by (Bao 2013).

**Table 2** Descriptive statistics

	Mean	SD	Skewness	Kurtosis
Manager leadership competencies	3.6745	0.47746	−0.217	1.389
Resource commitment	3.4833	0.47524	−1.034	1.390
Environmental uncertainty	3.6108	0.52938	−0.557	−0.032
SDGs	3.3670	0.39753	−1.313	2.302

## Common method bias

While we made efforts to mitigate social desirability bias and common method bias in our research, such as disclosing in the cover letter that the data would only be used for research purposes and would not be publicly published, and offering respondents the choice to participate voluntarily without restrictions, cross-sectional data are often criticized for their potential lack of validity concerning common method bias. To address this concern, we conducted Harman's Single Factor Test in SPSS using explanatory factor analysis. This test revealed only four factors with eigenvalues greater than 1. The first factor accounted for only 45.72% of the variance, confirming that common method bias is not a significant threat to our results.

It is worth noting that Harman's single-factor test has been criticized for its limited applicability in recent research (Fuller et al. 2016). Therefore, we also employed another test in AMOS, known as the common latent factor test. To do this, we created a common latent factor and integrated it into a CFA model. The results of this model showed weaker fit indices compared to the main CFA model in terms of GFI, TLI, CFI, NFI, RMR, and RMSEA. This provided us with confidence in the absence of common method variance in the data.

## Main analysis

### Correlation

To check the correlation among the variables, we used SPSS (see Table 3). According to Akoglu (2018), a value below 0.30 indicates a low correlation, 0.30 to 0.50 shows an average while above 0.50 deals with a strong correlation. In our data set, we found different correlations among the variables, of which manager competencies and resource commitment illustrate weak, manager competencies and SDGs show an average, while resource commitment and SDGs illustrate a strong correlation. Additionally, there are no values greater than the corresponding values of discriminant validity in the model that confirms that there is no multicollinearity issue in the data.

### Confirmatory factor analysis

We assessed the measurement model through an algorithm approach in SmartPLS. The aim of this approach was to evaluate the model fits based on factor loading, convergent validity, discriminant validity, and composite reliability. Based on the outcomes of this test, we found that all the items (see Table 4) contain desirable standardized factor loading (greater or equal to 0.70) (see Fig. 2) individually or collectively for a construct (Hair et al. 2013).

**Table 3** Correlation

Variables	1	2	3	4	5	6	7	8	9
1. Manager age	1								
2. Manager experience	0.581**	1							
3. Manager education	−0.128*	0.040	1						
4. Firm age	0.043	0.091	0.161**	1					
5. Firm size	0.058	0.056	0.127*	0.196**	1				
6. Manager leadership competencies	0.036	0.079	0.116	0.172**	0.142*	1			
7. Environmental uncertainty	−0.117	−0.081	0.028	0.055	0.027	−0.263**	1		
8. Resource commitment	0.081	0.164**	0.221**	0.254**	0.256**	0.266**	0.064	1	
9. SDGs	0.133*	0.265**	0.235**	0.363**	0.385**	0.330**	0.010	0.601**	1

\*Correlation is significant at the 0.05 level (2-tailed). \*\*Correlation is significant at the 0.01 level (2-tailed)

### Convergent validity

Convergent validity, sometimes referred to as Average Variance Extracted (AVE) evaluates the variance explained by items assigned for a specified variable. According to Yopp (1988), a cumulative variance greater than 0.50 (see Table 4) demonstrates satisfactory convergent validity (see Table 4). In our results, all the variables have desirable convergent validity.

### Discriminant validity

It can be calculated by taking a square root of AVE. It shows if the items do not discriminate with each other and shows distinguish roles in the variable. A value greater than 0.70 (see Table 4) confirms acceptable discriminant validity (Fornell and Larcker 1981). In our research, all the variables show satisfactory values.

### Composite reliability

As presented by the name, it shows reliability among items assigned for a variable. In other words, it shows the internal consistency of items toward a specified variable. An acceptable value of composite reliability should be greater than 0.70 (Bagozzi and Phillips 1982). Our sample met this condition as all the variables have standard composite reliability (see Table 4).

The F-square and R-square values are reported in Table 5. The R-square value indicates that the variance in resource commitment and SDGs is 10% and 59.6%, respectively, explained by manager leadership competencies in the presence of the manager's age, experience, education, firm age, size, and financial performance. The F-square value indicates that all the factors show small to medium effects on resource commitment and SDGs ( $F^2 =$

0.10 represents a smaller effect, 0.25 represents a medium effect).

We evaluated the predictive relevance scores of the variables in the SmartPLS via the blindfolding method (see Table 6). The  $Q^2$  score greater than zero shows that the endogenous construct has predictive relevance. The  $Q^2$  score for both endogenous constructs (resource commitment and SDGs) was higher than zero in our model; we can establish that these constructs have predictive relevance.

### Structural models

The hypothesized model was tested through the bootstrapping approach (re-sampling method 2000). The results of the structural model (see Fig. 3) indicate that a manager's leadership competencies have a direct and significant influence on SDGs ( $\beta = 0.142$ ,  $p < 0.05$ ) and resource commitment ( $\beta = 0.319$ ,  $p < 0.05$ ) that support H1, and H2.

Considering the mediating role of resource commitment, the results indicate that (see Table 7), resource commitment partially mediates the nexus between managers' leadership competencies and SDGs (direct path  $\beta = 0.142$ ,  $p > 0.005$ ; indirect path  $\beta = 0.104$ ,  $p < 0.05$ ). While considering the moderating role of environmental uncertainty in the relationship between managers' leadership competencies and SDGs, the results (see Table 7) of the interactive term of environmental uncertainty and manager leadership competencies indicate that environmental uncertainty does not moderate the relationship between managers' leadership competencies and SDGs ( $\beta = 0.09$ ,  $p > 0.005$ ). These results favored H3, while H4 is rejected.

### Robustness checks

To validate the results and policy implications, we tested the model in SPSS using linear regression analysis (refer to Table 8). We performed four models as follows: In the first model, we examined the role of leadership



**Table 4** Factor loading, validity, and reliability

Variables	Factor loading	Cronbach's alpha	Composite reliability	AVE	$\sqrt{\text{AVE}}$
Environmental uncertainty		0.866	0.914	0.705	0.839
EU1	0.858				
EU2	0.829				
EU3	0.854				
EU4	0.817				
Manager leadership competencies		0.895	0.905	0.703	0.838
LC1	0.848				
LC2	0.820				
LC3	0.824				
LC4	0.824				
LC5	0.876				
Resource commitment		0.822	0.829	0.651	0.806
RC1	0.869				
RC2	0.764				
RC3	0.795				
RC4	0.796				
SDGs		0.941	0.943	0.517	0.719
SDG1	0.667				
SDG2	0.751				
SDG3	0.674				
SDG4	0.705				
SDG5	0.758				
SDG6	0.732				
SDG7	0.713				
SDG8	0.703				
SDG9	0.765				
SDG10	0.780				
SDG11	0.722				
SDG12	0.621				
SDG13	0.683				
SDG14	0.639				
SDG15	0.678				
SDG16	0.819				
SDG17	0.787				
Financial performance		0.832	0.833	0.599	0.773
fp1	0.832				
fp2	0.729				
fp3	0.768				
fp4	0.720				
fp5	0.816				

AVE average variance extracted, DV discriminant validity

competencies in SDGs; in the second model, we assessed the impact of leadership competencies on resource commitment; the third model illustrated the mediating role of resource commitment, while the fourth model indicated the moderating role of environmental uncertainty between leadership competencies and resource commitment. In each model, we included managerial attributes such as

age, experience, and education, as well as firm-level attributes, namely size, age, and financial performance, as control variables.

Upon reviewing the results, we observed a high degree of similarity between the results obtained from Smart-PLS and the findings of the first three regression models. However, the regression analysis (as presented in model

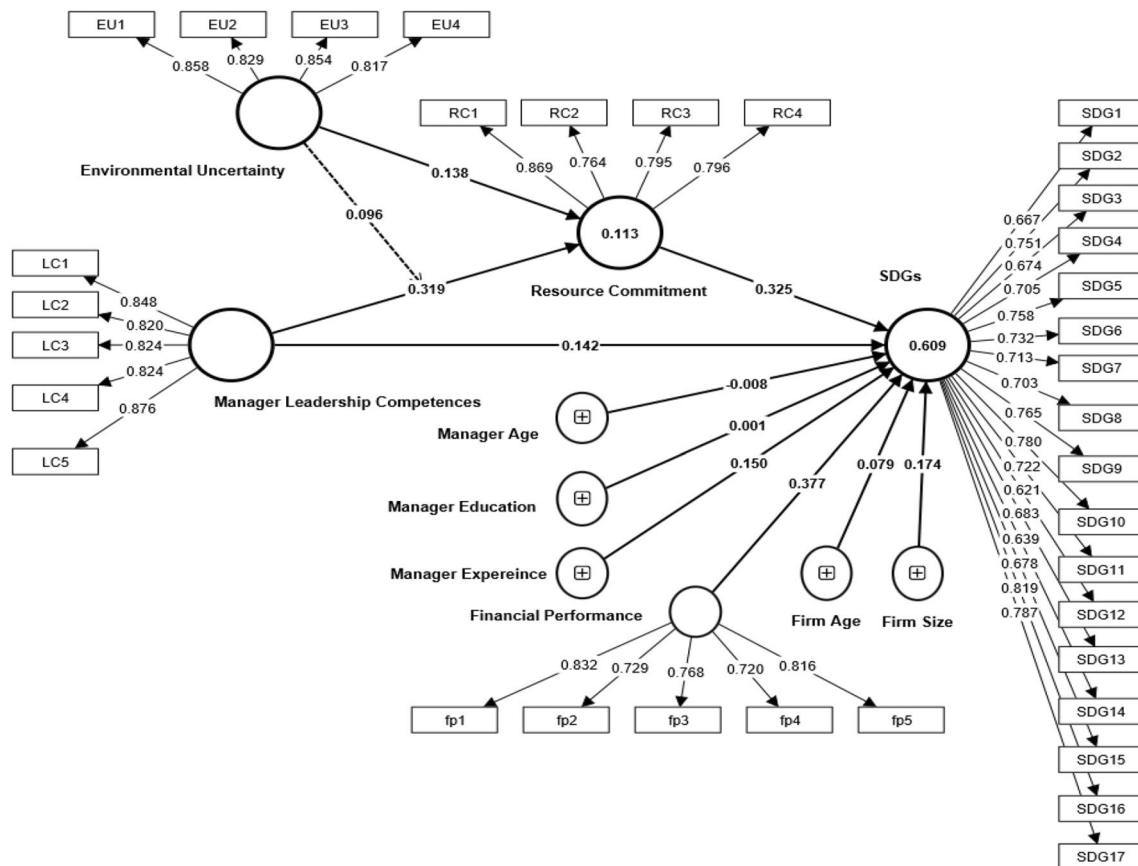


Fig. 2 Measurement test

Table 5 F-square and R-square

	Resource commitment	SDGs	R-square	R-square adjusted
Manager age		0.000		
Manager education		0.000		
Manager experience		0.037		
Firm age		0.014		
Firm size		0.069		
Financial performance		0.271		
Environmental uncertainty	0.019			
Manager leadership competencies	0.107	0.046		
Resource commitment			0.113	0.102
SDGs			0.609	0.596

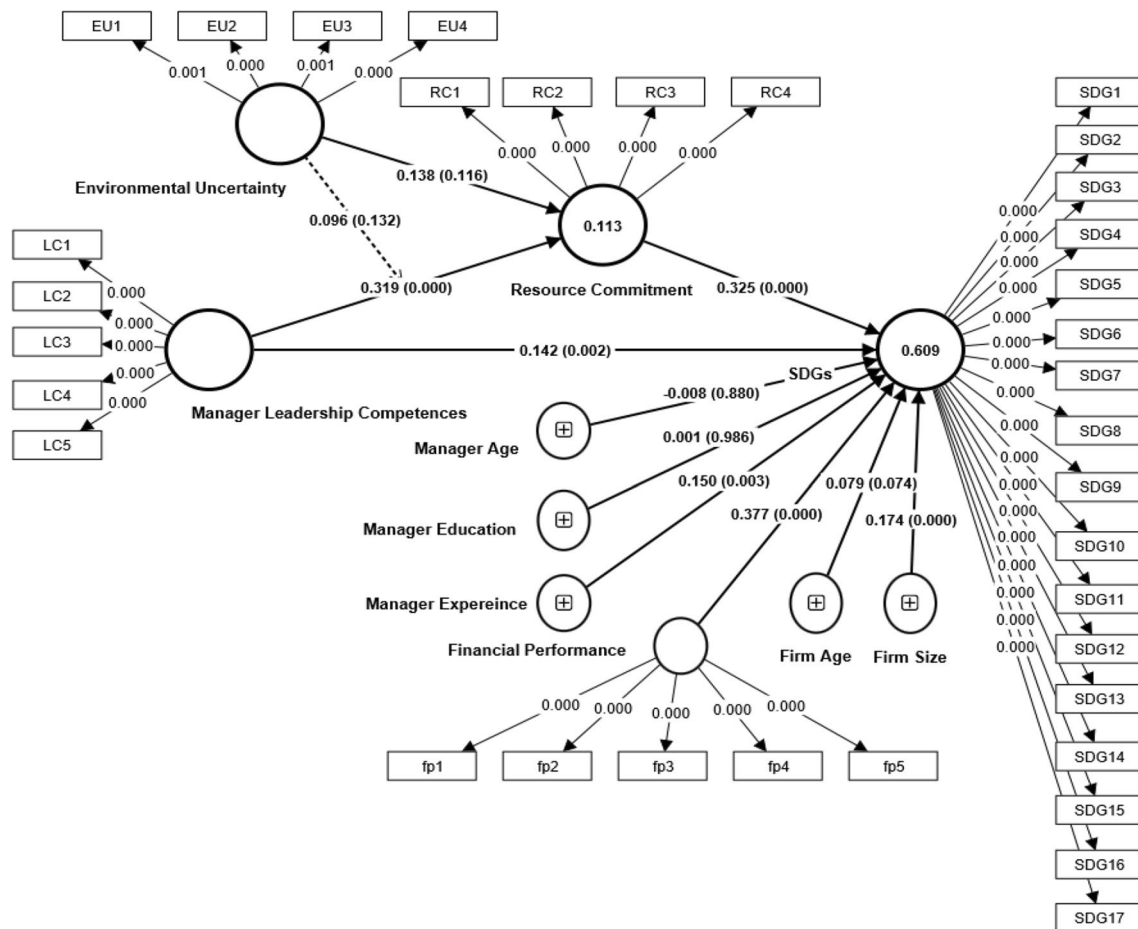
4) revealed a positive and significant moderating impact of environmental uncertainty on resource commitment. This indicates that environmental uncertainty strengthens the positive association between leadership competencies and resource commitment. These results differ somewhat

from those obtained using SmartPLS, which showed an insignificant moderating role.

In summary, it becomes apparent that environmental uncertainty plays a significant role in SMEs operating in Pakistan.

**Table 6** Predictive relevance ( $Q^2$ )

Variables	Construct cross validity redundancy			Construct cross-validity communality		
	SSO	SSE	$Q^2 (=1 - SSE/SSO)$	SSO	SSE	$Q^2 (=1 - SSE/SSO)$
Firm age	255.000	255.000	0.000	38.006	38.006	0.000
Firm size	255.000	255.000	0.000	32.372	32.372	0.000
Manager age	255.000	255.000	0.000	33.544	33.544	0.000
Manager education	255.000	255.000	0.000	43.847	43.847	0.000
Manager experience	255.000	255.000	0.000	33.485	33.485	0.000
Manager leadership competencies	1275.000	1275.000	0.000	192.174	192.174	0.000
Resource commitment	1020.000	955.019	0.064	147.066	132.004	0.102
Environmental uncertainty	1020.000	1020.000	0.000	99.375	99.375	0.000
Financial performance	1275.000	1275.000	0.000	185.330	185.330	0.000
SDGs	4335.000	3031.616	0.301	626.018	429.834	0.313

**Fig. 3** Structural model

**Table 7** Hypotheses testing

Paths	Beta coefficient	<i>p</i> values
Control variables		
Manager age → SDGs	−0.008	0.880
Manager experience → SDGs	0.150	0.003
Manager education → SDGs	0.001	0.986
Firm age → SDGs	0.079	0.074
Firm size → SDGs	0.174	0.000
Financial performance → SDGs	0.377	0.000
Direct effect		
Manager leadership competencies → resource commitment	0.319	0.000
Manager leadership competencies → SDGs	0.142	0.002
Resource commitment → SDGs	0.325	0.000
Indirect effect		
Manager leadership competencies → resource commitment → SDGs	0.104	0.000
Moderating effect		
Environmental uncertainty → resource commitment	0.138	0.116
Environmental uncertainty x manager leadership competencies → resource commitment	0.096	0.132

**Table 8** Regression analyses (robustness)

Particular	Model 1 SDGs		Model 2 Resource com- mitment		Model 3 SDGs		Model 4 Resource com- mitment	
	$\beta$	<i>p</i>	$\beta$	<i>p</i>	$\beta$	<i>p</i>	$\beta$	<i>p</i>
Control impact	1.372	0.000	1.851	0.000	1.372	0.000	1.851	0.000
Firm age	0.065	0.010	0.056	0.102	0.065	0.010	0.056	0.102
Firm size	0.075	0.000	0.053	0.009	0.075	0.000	0.053	0.009
Manager education	0.021	0.352	0.055	0.079	0.021	0.352	0.055	0.079
Manager experience	0.095	0.001	0.056	0.156	0.095	0.001	0.056	0.156
Manager age	0.000	0.991	0.008	0.846	0.000	0.991	0.008	0.846
Fin. performance	0.439	0.000	0.300	0.000	0.439	0.000	0.300	0.000
Main impact	0.811	0.000	1.247	0.000	0.453	0.018	1.267	0.000
Firm age	0.054	0.025	0.045	0.184	0.041	0.063	0.037	0.269
Firm size	0.068	0.000	0.045	0.024	0.054	0.000	0.045	0.025
Manager education	0.014	0.524	0.048	0.124	0.000	0.988	0.048	0.116
Manager experience	0.090	0.001	0.052	0.185	0.075	0.003	0.052	0.174
Manager age	−0.001	0.966	0.007	0.861	−0.003	0.902	0.022	0.599
Fin. performance	0.432	0.000	0.292	0.000	0.349	0.000	0.306	0.000
Leadership competencies	0.180	0.000	0.193	0.001	0.124	0.001		
Resource commitment					0.287	0.000		
LCxEU							0.047	0.000
$R^2$	0.49		0.22		0.49		0.22	
$R^2$ change	0.038		0.035		0.16		0.048	

LC leadership competencies, EU environmental uncertainty

## Discussion

Based on experimental evidence from emerging SMEs, this research examines the importance of managers'

leadership competencies in relation to resource commitment and SDGs within a turbulent environment. Previous research has emphasized the strategic challenges that firms face when adopting sustainable strategies, considering both qualitative (Aarseth et al. 2017; Hristov et al.

2022) and quantitative (Anwar et al. 2020; Khattak 2020) approaches. This research goes further and assesses the role of leadership competencies in small business managers concerning resource commitment and SDGs in an uncertain environment, based on empirical evidence.

Our results indicate that owners and managers of SMEs with leadership competencies significantly contribute to SDGs. The results correspond to the previous studies, where Tabassi et al. (2016) describe that leadership competencies spur sustainable performance in the construction industry. Similarly, Suriyankietkaew et al. (2022) illustrate that sustainable leadership practices help SMEs in sustainable outcomes that are useful for communities. Our outcomes are further in line with Hesselbarth and Schaltegger (2014), who demonstrate that manager leadership competencies are considered as a key element for CSR in today's era.

While considering the mediating role of resource commitment, our findings show that manager leadership competencies are equally important for resource commitment and SDGs. For instance, we found that resource commitment partially mediates the relationship between leadership competencies and SDGs. It signals that managers of SMEs must balance resources efficiently to configure their sustainable activities. The results are in line with Metcalf and Benn (2013) who state that leaders perform essential activities, for instance solving problems, balancing and organizing resources, and participating in CSR practices. Similarly, Chen and Hung-Baesecke (2014) note that leaders encourage employees to participate in CSR and communicate with departments to manage the resources and time for better outcomes of CSR. Particularly in SMEs, committing resources is an important strategy for leaders and top management teams to articulate CSR activities in a better way. SMEs who commit resources have positive results in SDGs.

Our results also suggest that environmental uncertainty does not play a significant moderating role between managerial competencies and resource commitment in SMEs operating in emerging markets, despite the persistent environmental uncertainty in the country over the years. Regardless of the environmental conditions, top managers of SMEs remain engaged in their routine daily operational activities. These findings diverge from previous studies that have reported a significant moderating effect (Moreira et al. 2022; Waldman et al. 2001; York and Venkataraman 2010) and negative (e.g. Bresciani et al. 2022; Darvishmotevali et al. 2020; Kwok et al. 2019) role of environmental uncertainty. However, considering the environment in Pakistan, we illustrate that managers face no significant threat requiring them to modify their strategies for sustainable practices. Our results demonstrate that environmental uncertainty is not a significant determinant of resource commitment for SDGs in Pakistani SMEs. However, managers should not

completely ignore the turbulent environment to get ready for unexpected outcomes.

## Implications for practice

Practically, the insights from this research emphasize the pivotal roles of managerial leadership competencies in resource commitment and SDGs within a turbulent environment. Managerial leadership competencies emerge as crucial factors in resource commitment and SDGs. According to Aboyassin and Abood (2013), incompetent managers could lose business outcomes, while competent managers respond to external threats on time (Issah et al. 2023). SMEs in particular have resource scarcity (Khattak and Shah 2020) that hampers their progress in a sustainable journey. Nevertheless, efficiently managing resources is an important strategy for executives in today's environment. To address this, SMEs should hire competent leaders who can assist in managing, organizing, and balancing resources for environmental and social activities. Particularly in highly volatile markets, SMEs should prioritize competent leaders to optimize their resource allocation for sustainable practices. Leadership competencies serve as a safeguard against uncertain environments in SMEs. Our findings indicate that competent leaders allocate resources to SDGs even in unstable environments. In other words, environmental instability does not pose a threat to SMEs if top management possesses leadership competencies in resource management for SDGs. However, we still recommend that managers remain attentive to environmental uncertainty, as the regression analysis demonstrates its significant moderating role. Therefore, environmental uncertainty should not be overlooked when managing resources for SDGs in small businesses.

These insights also guide policymakers in formulating their strategies for SDGs. SMEDA and relevant authorities should allocate sufficient resources to support small businesses in Pakistan in implementing sustainable activities. SMEs are in great need of resources, and the industry requires substantial government support. Specifically, the small business industry should receive assistance in terms of technological, financial, and human resources to promote sustainability.

## Contributions of the study

This research contributes significantly to the existing literature on leadership, resource management, and sustainability in three major ways. First, we emphasize the importance of leadership competencies in achieving SDGs through resource commitment in the face of environmental uncertainty. Understanding the role of managerial leadership in SDGs within the context of environmental factors and resource allocation is crucial. For instance, top managers



are responsible leaders who efficiently manage resources to achieve sustainable outcomes while navigating environmental and stakeholder pressures. Previous studies have made contributions, but they have certain limitations, primarily focusing on the direct relationship between leadership, resources, and sustainable practices. In contrast, our research delves deeper by exploring the mediating role of resource commitment and the moderating role of environmental uncertainty in the relationship between leadership competencies and SDGs. Additionally, we extend previous findings by highlighting the significant moderating effect of environmental uncertainty on the links between competencies and sustainable practices (e.g. Afshar Jahanshahi and Brem 2020; Tyler et al. 2023; Waldman et al. 2001). However, our results suggest that uncertain environments do not significantly affect SMEs with leadership competencies. We posit that leadership competencies act as a shield against uncertain environments in SMEs during their resource commitment for SDGs.

Secondly, our research places emphasis on SMEs in emerging markets, a segment that has been often overlooked in discussions related to SDGs and leadership. It is worth noting that more than 90% of businesses worldwide are SMEs, and this figure includes Pakistan, where SMEs contribute approximately 40% to the GDP (Khattak and Shah 2020). Despite their substantial number, research has not yet thoroughly examined how SMEs manage resources to navigate the turbulent environment in pursuit of SDGs. Therefore, this research enriches the literature concerning SMEs in emerging economies through the perspective of leadership and SDGs.

Thirdly, this research contributes to the upper echelon theory (Hambrick and Mason 1984) which highlights the significance of managerial characteristics in organizational outcomes. Our findings support this theory and reveal that managerial competencies play a pivotal role in resource management and sustainable outcomes. Consequently, this contribution paves the way for future researchers to replicate and expand upon the model in different contexts within the framework of the upper echelon theory.

### Limitations and future research studies

This study has certain limitations that present opportunities for future research by scholars. We collected data exclusively from SMEs operating in the Pakistani meeting market. We recommend that researchers gather data from publicly listed and larger firms to obtain a more comprehensive dataset. Our data is cross-sectional, which has been subject to criticism for potential common method bias. Therefore, we recommend employing interviews and other data sources, such as annual reports, to address issues related to social desirability bias. Additionally, we

encourage researchers to extend this model to other markets to provide a more robust understanding of the results. For instance, while we tested the model under conditions of environmental uncertainty, it is worth noting that resource constraints remain a significant issue for SMEs worldwide (Malca et al. 2020) that could be an interesting factor for future studies.

Our study addresses the 17 SDGs introduced in 2025. However, we recommend exploring other practices, such as environmental performance, green innovation, and carbon emissions, to obtain more comprehensive results. Similarly, gathering data on managerial attributes from large and listed firms would enhance the validity of the model and contribute to the literature on policy implications. Likewise, while our conceptualized model has been tested under environmental uncertainty, future researchers have the opportunity to assess the model under conditions of competition, technological turbulence, or institutional pressures to gain deeper insights

### Conclusion

Rooted in the upper echelon theory, this research explores the role of managerial leadership competencies in the context of SDGs, with resource commitment mediating and environmental uncertainty moderating this relationship. The results, derived from 254 responses from SMEs, indicate that leadership competencies have a significant impact on SDGs, while resource commitment partially mediates this relationship. However, environmental uncertainty does not exhibit a significant role in the model. The implications of this research suggest that SMEs should prioritize the development of competent leadership to efficiently manage resources for SDGs, especially in a highly volatile market.

### Appendix

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#### Managers' leadership competencies

- Vision and imagination
- Engaging communication
- Critical analysis and judgment
- Inspire followers to go beyond their own interest
- Empowering

#### Resource commitment

- Top management in our organization prepares a budget each year and set aside adequate funds to be practically dedicated to environmental management programs
-

Our organization has invested sufficient financial resources to develop knowledge and information systems to effectively engage in environmental management activities.

Our organization has invested sufficient management resources to develop knowledge and information systems to effectively engage in environmental management activities.

As far as environmental management practices are concerned, our organization has an appropriate investment in technological infrastructure.

#### Environmental uncertainty

It is impossible to foresee today how our business segment is going to change over the next 10 years.

It is not possible to make exact predications about our business segment's development over the next 10 years.

How our market is going to change over the next 10 years is unpredictable.

Over the next 10 years, there can be changes that represent a major threat to the competitiveness of our company.

#### Firm performance

Return on equity

Return on assets

Sales revenues

Market shares

Return on investment

#### Sustainable development goals

My firm takes part in poverty reduction.

My firm plays a significant role in hunger-reduction.

My firm is working for health care and wellness.

My firm provides quality education to employees and employees' families.

My firm always works for gender equality.

I have access to clean water and sewerage.

My firm has accessible and non-polluting energy.

My firm takes part in decent work and economic growth.

My firm has innovation and effective infrastructure.

My firm always works to reduce inequalities.

My firm is creating sustainable cities and communities.

My firm has the ability for responsible consumption and production.

My organization always considers the weather care.

My firm always cares about under water life.

My firm always cares for life in terrestrial ecosystems.

My firm participates in peace building, justice, and corruption-free institutions.

My organization strives to build alliances to achieve the above goals.

**Author contribution** The Shahzad Ahmad has worked on the initial draft, literature review and results. Chunliin Xin has reviewed the draft and supervised the project. Ehsan Ullah helped in data analysis and literature. Saeed Siyal has worked on literature review and data collection.

**Data availability** The data will be available on request from the first authors.

## Declarations

**Ethical approval** Ethical committee of the BUCT approved the research.

**Consent to participate** We gathered data from SMEs as voluntarily.

**Consent for publication** Authors are agreed to publish the work.

**Competing interests** The authors declare no competing interests.

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