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Fostering sustainable entrepreneurship: the role of organizational mission, green innovations, entrepreneurial motivation and civic engagement in shaping sustainable ventures

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Abstract

Purpose – Sustainable entrepreneurship (SE) and innovation are crucial to addressing global sustainability challenges amid rapid environmental change. This study aims to identify the factors that shape sustainable entrepreneurial behavior globally.

Design/methodology/approach – Data collected from 349 green entrepreneurs across 20 countries using an online survey were analyzed using partial least squares structural equation modeling.

Findings – The findings revealed that sustainability missions, sustainable innovation (SI) and the need for achievement have a significant positive impact on SE. The outcomes indicate that fostering personal motivation for achievement, supporting the adoption of SIs and mission-driven leadership can foster green ventures around the globe. Furthermore, green ventures have the potential to create far-reaching societal benefits, including job creation, community development and enhanced environmental awareness.

Social implications – The findings show that SI, mission-driven leadership and entrepreneurial motivation promote green ventures that create jobs, reduce inequalities, strengthen economic and support sustainable development.

Originality/value – Entrepreneurial ecosystems play a vital role in nurturing sustainable entrepreneurial behavior among individuals and organizations. However, much of the existing literature on SE has limited generalizability because of its regional focus. This study, the first of its kind at the international level, examines green entrepreneurs from over 20 countries.

Keywords Sustainable entrepreneurship, Sustainable ventures, Sustainable business activities, Innovations, Green business

Paper type Research paper

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Promover o empreendedorismo sustentável: o papel da missão organizacional, das inovações verdes, da motivação empreendedora e do engajamento cívico na construção de empreendimentos sustentáveis

Resumo

Objetivo – O empreendedorismo e a inovação sustentáveis são cruciais para enfrentar os desafios globais da sustentabilidade em meio às rápidas mudanças ambientais. O principal objetivo desta pesquisa é identificar os fatores que moldam o comportamento empreendedor sustentável globalmente.

Metodologia/abordagem – Os dados coletados de 349 empreendedores verdes em 20 países por meio de uma pesquisa online foram analisados utilizando PLS-SEM.

Resultados – Os resultados revelaram que missões de sustentabilidade, inovação sustentável e a necessidade de realização têm um impacto positivo significativo no empreendedorismo sustentável. Os resultados indicam que fomentar a motivação pessoal para a realização, apoiar a adoção de inovações sustentáveis e a liderança orientada por uma missão podem impulsionar empreendimentos verdes em todo o mundo. Além disso, os empreendimentos verdes têm o potencial de gerar benefícios sociais de longo alcance, incluindo a criação de empregos, o desenvolvimento comunitário e o aumento da conscientização ambiental.

Implicações sociais – Os resultados mostram que a inovação sustentável, a liderança orientada por uma missão e a motivação empreendedora promovem empreendimentos verdes que criam empregos, reduzem as desigualdades, fortalecem a economia e apoiam o desenvolvimento sustentável.

Originalidade/valor – Os ecossistemas empreendedores desempenham um papel vital no fomento do comportamento empreendedor sustentável entre indivíduos e organizações. No entanto, grande parte da literatura existente sobre empreendedorismo sustentável tem generalização limitada devido ao seu foco regional. Este estudo, o primeiro do gênero em nível internacional, examina empreendedores verdes de mais de 20 países.

Palavras-chave Empreendedorismo sustentável, Empreendimentos sustentáveis, Atividades empresariais sustentáveis, Inovações, Negócios verdes
Tipo de artigo Trabalho de pesquisa

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Introduction

Climate change and ecological degradation caused by business activities pose a significant threat to human existence on Earth (Ajide *et al.*, 2024). Undoubtedly, business activities are essential for economic growth, but there is a dire need for them to engage in sustainable practices (Argade *et al.*, 2021). Sustainable entrepreneurship (SE) considers all the dimensions of sustainability (economic, social and environmental) (Audretsch *et al.*, 2023). It promotes the conservation of natural resources and reduces ecological deterioration from business activities necessary for fueling economic development (Ayandibu and Ayandibu, 2024). It plays a vital role in creating employment and economic development of nations. Therefore, countries are working to enhance the entrepreneurial capabilities of youth through various initiatives (Bocken, 2015).

SE contributes to human well-being through commercial and social innovations with minimal environmental degradation (Omri *et al.*, 2025). It also provides an opportunity for entrepreneurs' personal development, growth and well-being. Entrepreneurs work independently, enabling them to use their skills and abilities meaningfully. On the other hand, in conventional professions, individuals have less control and freedom to use their energies and talents, which can negatively affect their well-being (Guan *et al.*, 2019). Greater freedom enjoyed by entrepreneurial activities recharges psychological resources, improves resilience and boosts self-esteem (Antonsson *et al.*, 2024). Thus, entrepreneurship can bring about positive changes in society and improve societal well-being.

Entrepreneurs have used innovative techniques that have transformed many industries, created employment opportunities and improved countries' socioeconomic conditions. Prior studies on entrepreneurship have examined its role as an engine of economic growth and development effects at the regional level (Zhakupov *et al.*, 2023). The literature also validates entrepreneurship as a source of improved psychological well-being at the individual level (Nikolaev *et al.*, 2020). Zahra and Wright (2016) stated that entrepreneurs may add to or even create problems that hinder the growth of societies without taking responsibility for solving them. The agreement across these perspectives is that we need to reconsider the different implications of entrepreneurial activities at the societal level.

SE plays a critical role in addressing global sustainable development issues, as its impact extends beyond entrepreneurs and has broader societal implications. Prior studies have identified different barriers and challenges to SE across different countries. The prior literature has not identified the motivations, barriers and challenges of SE on a global level. Therefore, the existing literature has limited generalizability because of the predominance of regional studies. This research aims to fill this gap by examining green entrepreneurs from 20 countries and identifying the common factors that shape SE.

The study addresses this research gap by integrating the four comprehensively measured constructs: sustainability mission (SM), sustainable innovation (SI), needs for achievements (NA) and community engagement (CE), using cross-sectional data collected from different countries. Moreover, this study draws on insights from a resource-based view and Isenberg's entrepreneurial ecosystem framework to offer a comprehensive entrepreneurial framework. Pelegrini *et al.* (2025) underscore the importance of sustainable ecosystem components in generating multiple forms of value, while Bertello *et al.* (2022) highlight the integration of knowledge intensity and sustainability within entrepreneurial ecosystems. Building on these insights, the primary objective of this study is to identify the key factors within entrepreneurial ecosystems that globally nurture SE.

This study contributes to the literature on SE by emphasizing how psychological, organizational and community dimensions contribute to promoting SE across different nations. Moreover, this study bridges internal and external perspectives by aligning the insights of the resources-based view by describing internal resources and capabilities with stress and external systematic support (Isenberg's model). In addition, the inclusion of CE also presents one of the underexplored constructs in the sustainability and entrepreneurship framework.

Hypotheses development

SE and integrating sustainability goals at the beginning of start-ups is of utmost importance to foster and promote a green economy (Bocken, 2015). Shepherd and Patzelt (2011) noted that recognition of unsustainable opportunities is easier when solely motivated by economic gains than sustainable opportunities considering all three dimensions of sustainability. This makes SE more complex than other forms of entrepreneurship, considering only one dimension of sustainability. Integrating sustainability into business activities requires the inclusion of development goals in the vision and mission of new ventures. Sustainability requires new start-ups to decrease greenhouse gas emissions in the development of goods and services (Breuer *et al.*, 2018). The consideration of sustainability in the mission of new ventures reflects the extent to which a proposition is associated with economic and social value creation (Bocken, 2015), and whether the goods and services of new ventures have beneficial or detrimental influences on the ecosystem (Fichter and Tiemann, 2020). Sustainability integration in the mission and vision of new enterprises is essential to promote SE and is a driving force for entrepreneurial activities (Freimann *et al.*, 2010). Sustainability-driven entrepreneurs are more likely to challenge traditional business activities that deplete natural resources (York and Venkataraman, 2010).

This cross-national study requires the integration of broader ecosystem-level perspectives of entrepreneurship. In this regard, Isenberg's (2010) entrepreneurial ecosystem model is most relevant to describe how study constructs are reliable while focusing on the cross-national ecosystem. This model has six domains: policy, finance, culture, support, human capital and markets. These domains are interconnected, which can hinder or promote the ecosystem for SE. The constructs of the study, SM, SI, CE and NA, are linked to Isenberg's entrepreneurial ecosystem framework. For example, the SM of an entrepreneur is often generated within a culture that does not compromise environmental stewardship, and this type of culture is reinforced by national policies and institutions. Similarly, human and financial capital along with technical support networks, affect the SI. Moreover, the NA highlights the psychological traits of an entrepreneur, which largely depend on the culture, education systems and role models. The addition of CA in the model indicates the important dimension that signifies the social aspects that complement Isenberg's entrepreneurial ecosystem framework. For example, the domains of Isenberg's framework, like culture, support and market, greatly depend on social relationships and local legitimacy. Therefore, CA describes how a green entrepreneur interacts within society and how they earn the trust of the community, customers, etc. By considering these four dimensions, in light of Isenberg's ecosystem framework, will describe how these drivers can affect the SE.

This means that SMs are closely connected to the emergence of sustainable entrepreneurs. A SM is an indication of a business entity's commitment to attaining sustainable ecological and social objectives and is a cornerstone of sustainable venturing. This relationship has been well-illustrated in several studies. Some examples include York and Venkataraman (2010), who find that organizations with a sustainability vision and strategy are central to managing environmental fluctuations and responding to societal needs. In addition, Shepherd and Patzelt (2011) noted that sustainable entrepreneurs have opportunities to introduce environmental improvements into their businesses. Therefore, we assume:

H1. A sustainability mission positively affects sustainable entrepreneurship.

Innovations that can generate positive ecological and social outcomes require a transition to become effective sustainability innovations (Geels, 2010). This is the challenge that sustainable entrepreneurs face each time they seek to spread new solutions to sustainability issues through business and to achieve market dominance and sociopolitical influence (Schaltegger and Wagner, 2017). Sustainable business strategies relate the success of an enterprise to the realization of positive impacts on the natural environment and people – value creation for multiple stakeholders (Freudenreich *et al.*, 2020). Innovation has long been discussed as a solution to sustainable development; however, many questions remain about how it will deliver results. The most significant potential source of risk for sustainable entrepreneurs is whether they can generate viable businesses from their sustainability, regardless of the many barriers that they are likely to encounter (Kiefer *et al.*, 2019).

Sustainability innovations are, therefore, aligned with SE, as the two seek to generate long-term sustainable solutions to social and ecological problems. By adopting an innovative approach, sustainability-oriented entrepreneurs play a significant role in creating sustainable business opportunities. Modern research illustrates this relationship, and recent studies support these points. For instance, Kraus *et al.* (2023) noted that sustainable entrepreneurs are at the forefront of helping firms implement green technologies and other innovations that produce less pollution and optimize the use of resources. Similarly, Hörisch *et al.* (2014) noted that SIs that are entrepreneurship initiatives lead to the transformation of industries by changing "business as usual" practices and creating and sustaining ecological and economic systems. This study assumes that:

H2. Sustainable innovations positively relate to sustainable entrepreneurship.

The concept of NA, as proposed by motivational theories, is relevant to the behavioral expressions of entrepreneurship, particularly in SE. A strong NA tends to impose challenging courses of action, adopt new methods and take carefully accepted risks. Thus, this motivational force is compatible with the conceptions of SE, which implies achieving business success and environmental and social sustainability. Sustainable enterprises are motivated by both self and other-centered purposes, aiming to develop companies for profit and for the common good. Schaltegger and Wagner (2017) established that sustainable entrepreneurs are inspired by the chance to create change. The frenzy affiliated with accomplishment is a significant incentive for sustainability-oriented ventures. In a similar context, Urban and Kujinga (2017) argue that the social instrumental need for achievement plays a role in the pursuit of entrepreneurial ventures, even as it enhances the sustainability imperative despite the risks.

The "achievement drive," an inherent psychological factor, heavily determines the behavior and or purpose of sustainable entrepreneurs. This notion was developed by McClelland (1961), who examined the needs that motivate the quest for achievement, reaching the top in the chosen field and demonstrating concrete accomplishments. This is an important consideration in the context of SE, because sustainable entrepreneurs seek to establish firms that offer sustainable solutions to society's problems and generate profits. The results of the study indicate that a strong need for achievement positively influences managers' and professionals' propensity to seek novel, more sustainable business strategies, integrating profitability and environmental responsibility. For example, Hall *et al.* (2010) posit that achievement-motivated contemporaries are the chief agents of change in industries through the provision of green goods and services and the creation of better methods. This motivation leads them to look for opportunities in fields where innovation is essential to solving problems. Schaltegger and Wagner (2017) opine that sustainable entrepreneurs undertake these challenges out of what they call social missions, in addition to seeking business success.

However, the issue is not only the NA regarding innovation but also related to perseverance in SE. As sustainable goals and objectives are longer and more complex than conventional entrepreneurship goals and objectives, they often face more challenges than traditional entrepreneurs. Such difficulties may also involve regulatory issues, market restrictions or other resource constraints that must be conquered. Frederiksen and Brem (2017) suggest that people with a high level of need achievement are likely to continue the activity despite the aforementioned challenges, as this will help achieve a goal. This need is also related to the notion of plan and mission, as sustainable entrepreneurs not only pursue monetary gains in the short term but are also willing to build a long-term business. Kirkwood and Walton (2010) discovered that this kind of motivation is one reason many entrepreneurs adopt sustainable business practices by conducting their business operations sustainably, regardless of short-term financial loss. Furthermore, Nwankwo and Kanyangale (2020) explain that achievement-oriented individuals engaged in business activities have a higher propensity to invest in new sustainable business models that meet their personal and business aspirations, because they are in a position to create innovative models to fit the dynamic market conditions and legal frameworks. These entrepreneurs are likely to urge others to practice sustainability within and across their businesses, which may encourage other industries to implement the same. Thus, we hypothesize:

H3. Need for achievement positively associates with sustainable entrepreneurship.

Another area of SE is the active involvement of various community stakeholders in entrepreneurship, which is conducted to solve sustainability issues. Owing to their

engagement in decision-making processes, communities provide valuable information that assists entrepreneurs in developing goods and services that reflect the community's culture. This participation can lead to the innovation of more sustainable policies, solutions, goods and services and organizations or systems that will help promote the conservation of the environment and social improvement. Including the community makes it easier for entrepreneurs to develop sustainable solutions because they consider the community and develop resistant business models that complement sustainable development goals (Mondo *et al.*, 2023; Stone, 2012). Entrepreneurs for sustainability expect inputs, assistance and resources from the community to achieve the common goal of developing sustainable businesses that meet economic, social and/or environmental goals (Kim *et al.*, 2023).

Engaging the community can enhance the outcomes that sustainable businesses bring to local welfare by ensuring that entrepreneurship supports the socially, environmentally and economically appropriate pursuits of the community's needs (Gupta and Matharu, 2022). When people in the community contribute their views to the problem-solving process, entrepreneurs receive feedback, leading to better outcomes (Mansuri and Rao, 2013; Narayan *et al.*, 2000). Such partnerships guarantee that the concept of SE develops both environmental and community sustainability as well as job creation, equity and boosting living standards (Olukotun, 2008).

Furthermore, community involvement ensures that sustainable business continues to be a responsibility to address the community's problems, making the economic lives of the community and business sustainable. This fosters a symbiotic situation of common benefit, where businesses are made more sustainable through enhanced local knowledge, while communities are empowered through the provision of solutions to both short and long-term needs (Stone, 2012; Mansuri and Rao, 2013). Therefore, we hypothesize:

H4. Community engagement significantly affects the development of sustainable entrepreneurship.

Materials and methods

Survey questionnaire and data collection

The questionnaire was prepared by using relevant literature and consulting researchers in the field. To achieve rationality and appropriateness of the cross-sectional questionnaire survey, the following two-step procedure was used. Initially, a questionnaire was developed, and the questionnaire constructs were checked and validated by four expert researchers (two professors and two associate professors) in the field of SE to ensure that every construct includes all necessary indicators. Second, the study conducted pre-testing with 10 green entrepreneurs who were undertaking green entrepreneurial activities. Before collecting the final data, the validity of the questionnaire was confirmed. First, the questionnaire was evaluated by the expert researchers (professors and associate professors). These researchers were selected for their expertise in entrepreneurship and green innovations. Their responses ensured alignment between the items and the construct, which confirmed the face and construct validity of the questionnaire. Furthermore, pre-testing was conducted with the 10 green entrepreneurs, and changes were made according to their responses, enhancing the relevance, interpretation and clarity of each item within a particular construct. All items were prepared based on the literature and professional opinions, which enhances the convergent and discriminant validity (DV) of the measurement model, which was also confirmed through factor loadings, AVE scores and Cronbach's alpha. The data collection across the 20 countries substantially enhanced the sample's diversity and size, which provided a strong set

of information in the form of diverse minds belonging to different economies having diverse characteristics.

This study was cross-sectional and solely based on a web-based questionnaire. Exploratory questionnaires were administered in 20 countries via Google Docs. These countries included China, India, Bangladesh, Nepal, Indonesia, Pakistan, Nigeria, Brazil, Bangladesh, Ethiopia, Philippines, Egypt, Turkey, Iran, Thailand, South Africa, Kenya, Colombia, Argentina and Myanmar. According to Granello and Wheaton (2004), online data collection reduces both time and costs. Thus, a cross-national sample was used to minimize location-specific bias and capture diverse entrepreneurial mindsets. Screening questions ensured that only respondents with at least one year of entrepreneurial experience and active engagement in environmentally oriented practices completed the full questionnaire, thereby strengthening the reliability and generalizability of the findings.

More than 120 sustainable entrepreneurs and enterprises were found on social networking sites (Facebook, Twitter and LinkedIn). There were 39 relevant groups of sustainable entrepreneurs and enterprises. Each group comprised more than 80 green entrepreneurs. For data collection, we wrote a message to the administrators of the groups, and after receiving consent from them, we forwarded a link to the questionnaire and requested them to share in their groups. Fifteen administrators shared the survey questionnaire with their groups. We assured entrepreneurs that the data were strictly for research purposes and would not be disclosed to any third party. The total number of members of the 15 selected groups was 2,340. We received responses from 349 green entrepreneurs. The survey was administered through closed, professionally moderated groups focused on green entrepreneurship, enhancing sample relevance through shared professional interests.

Econometric model

The study used partial least squares structural equation modeling (PLS-SEM) to analyze the collected data. PLS-SEM requires a sample size that is ten times the maximum number of formative indicators of paths directed at a particular construct (Hair *et al*., 2021). Therefore, the recommended sample size requirement is considerably lower than the actual sample size of this study, which justifies the sample size used for analysis. According to Comrey and Lee (2013), a sample size between 300 and 500 is considered good to very good, and our sample size is in this range, which will obtain meaningful outcomes, especially in the case of multivariate analysis like PLS-SEM.

This method has the advantage of performing the factor analysis and path analysis together. It is a second-generation category that can perform the analysis of various latent variables or constructs at a time. It uses various econometric techniques including factor analysis, regression and path analysis Byrne and Stewart (2006). This technique is widely used in social sciences which can provide reliable outcomes regarding the complex relationship among the latent variables (Kline, 2023). PLS-SEM include two different models to result in the impact of independent variables on dependent variables like the measurement model and structural model. The measurement model confirms the validity and uniqueness of the specified constructs before proceeding to structural analysis.

Results

Description of the observed items and constructs

SM is measured based on five observed items, securing a mode equal to 4. This signifies that most of the sampled respondents agreed strongly with all these individual items. The highest means of SM4 (=3.82), SM2 (=3.86) and SM3 (=3.92) indicated a slightly strong agreement among the respondents. This signifies that entrepreneurs generally consider environmental

and social impacts along with financial performance as the success of their business (SM4), prioritize long-term sustainability in their operations (SM2) and disseminate information about their business sustainability mission to stakeholders (SM3). SI also has five different observed items demonstrating continuous effort of developing environmental and socially sustainable solutions (SI1), producing the goods and services contributing to sustainable development (SI2), introducing new processes to reduce the environmental impact (SI3), considering the sustainability as a key driver of company's long-term strategy (SI4), investing in R and D addressing sustainability challenges (SI5). Among these items, the highest mode and averages for SI2 and SI4 signify that entrepreneurs mainly focus on the sustainable production of goods and services and consider sustainability as a key driver of their company's long-term strategies.

The need for achievement (NA) demonstrates important aspects of the entrepreneur's psychology. This indicates the motivation of an individual to attain success (NA1), set and achieve ambitious goals (NA2), consistently drive themself to reach a new milestone in business (NA3), seek personal fulfillment through entrepreneurial success (NA4) and feel pride in overcoming challenges (NA5), signifying that the outperforming competitor plays a crucial role in decision-making (NA6). Entrepreneurs strongly agreed with their CE, as CE has an overall average score of 4.29, which is higher than the midpoint of the five-point Likert scale (Table 1). Considering the individual items, the highest mean and mode of five indicated that entrepreneurs designed initiatives that directly benefited the community and fulfilled its needs (CE6). Seven items were used to measure SE, which provided an overall average of 4.16 with a standard deviation of 1.13. This indicates that entrepreneurs generally have a positive orientation toward SE. Considering the individual items, SE1 to SE5 had a mode equal to four, which emphasizes that entrepreneurs are highly engaged in these practices.

Indicators' reliability through factor loadings

A higher FL of an item indicates that it is reliable for measuring the underlying construct. For a reliable item, the FL must be greater than 0.70 to be included in a construct (Cheung and Rensvold, 2002; Su *et al.*, 2023), and items with an FL less than 0.70 must be removed (Ma *et al.*, 2023). FL scores for each item in Table 2 are greater than the threshold value (0.70), indicating that all items have a strong relationship with a specific construct.

Construct validity and reliability

When the indicators have passed their reliability test using FL, it is important to assess the internal consistency and reliability of the constructs. Cronbach's alpha was estimated for the internal consistency of the construct. Cronbach's alpha ranged from 0 to 1. A value close to one indicates that the indicators or items are highly consistent with the underlying construct (Pan *et al.*, 2024). The findings indicate that Cronbach's alpha is greater than 0.80 and in the range of 0.815–0.855, which shows that items are highly correlated with each other within a specific construct, leading to high internal consistency. Composite reliability (CR) is another parameter that is widely used to assess the internal reliability of the construct, and for high internal reliability, the CR value must not be lower than 0.60 [3]. The CR values for each construct in Table 3 are greater than 0.80, indicating the sufficiency and adequacy of the measurement model (Chin, 2009; Pan *et al.*, 2024) and the internal reliability of the constructs. AVE indicates convergent validity (CV) of the measurement model. For CV, AVE must be greater than 0.50 (Tian *et al.*, 2021). Therefore, the AVE for all the constructs was greater than 0.50.

[a] show main diagonal values indicating square root of each construct

Table 1. Mode and mean scores of individual items and constructs

Constructs	Mode	Mean	SD
Sustainability mission (SM)		3.81	1.12
Our business activities directly address sustainability challenges (SM1)	4	3.77	1.11
Our organizational mission emphasizes long-term sustainability goals (SM2)	4	3.86	1.23
We clearly communicate our sustainability mission to the stakeholders (SM3)	4	3.92	1.07
We measure success beyond profits, including impact (SM4)	4	3.82	1.19
We consistently invest in community welfare programs (SM5)	4	3.67	1.02
Sustainable innovations (SI)		*4.26*	*1.13*
We develop innovative sustainability-focused solutions (SI1)	4	3.75	1.15
Our products and services support sustainable growth (SI2)	5	4.91	1.01
We introduce processes that lower environmental impact (SI3)	4	3.89	1.13
Sustainable innovation drives our long-term strategies (SI4)	5	4.83	1.08
We invest in R&D for sustainability solutions (SI5)	4	3.94	1.27
Need for achievement (NA)		4.55	1.17
We are motivated to succeed in competition (NA1)	5	4.90	1.21
Achieving ambitious goals is our top priority (NA2)	4	3.87	1.13
We constantly aim for higher business milestones (NA3)	5	4.81	1.11
Our ventures give us personal fulfillment (NA4)	4	3.89	1.18
We take pride in overcoming business challenges (NA5)	5	4.92	1.29
Beating competitors influences many of our decisions (NA6)	5	4.88	1.09
Community engagement (CE)		4.29	1.19
We use community input to guide practices (CE1)	4	3.79	1.09
Partnering with local organizations is our priority (CE2)	4	3.85	1.16
We maintain transparent dialogue with communities (CE3)	5	4.82	1.17
Community members are empowered in initiatives (CE4)	4	3.71	1.19
We build strong ties with local stakeholders (CE5)	5	4.69	1.25
Our initiatives directly benefit community needs (CE6)	5	4.88	1.28
Sustainable entrepreneurship (SE)		4.16	1.13
Sustainability is integrated into our core operations (SE1)	4	3.91	1.19
We balance economic value with minimal harm (SE2)	4	3.84	1.2
Sustainability principles shape our decisions and strategies (SE3)	4	3.89	1.11
We prioritize long-term over short-term profits (SE4)	4	3.77	1.05
We seek innovative solutions to sustainability challenges (SE5)	4	3.94	1.01
We regularly assess sustainability impacts of our work (SE6)	5	4.92	1.17
Our entrepreneurship creates positive societal outcomes (SE7)	5	4.87	1.18

Note(s): The information about indicators of each construct can be found in the supplementary material S1

The results of DV indicate that the specific construct is truly different from the other constructs. Moreover, this indicates that the constructs are unique and do not correlate with other constructs. DV was assessed by comparing the square root of the AVE of a specific construct with the correlation scores of that construct with other constructs. This criterion requires that the square root of the AVE is greater than the correlation score of a construct with other constructs (Fornell–Larcker Criterion-FLC). The main diagonal indicates the square root of each construct, and the correlations among the constructs are below the main diagonal. Therefore, the values on the main diagonal are greater than the correlation scores of the specific constructs with all other constructs. Similarly, the heterotrait-monotrait ratios scores were below the critical limit (0.90), confirming the DV of constructs.

Goodness of fit and assessment of structural model

Table 4 indicates the values of the goodness of fit parameters, such as χ^2/df (=2.45), GFI (=0.911), AGFI (=0.930), CFI (=0.918), NFI (0.913) and RMSEA (0.066). All these parameters follow the threshold limits: χ2/df must be below 3, GFI, AGFI, CFI and NFI

Table 2. Factor loadings of each construct item

Indicators	Factor loadings
Sustainability mission (SM)	
SM1	0.876
SM2	0.865
SM3	0.859
SM4	0.821
SM5	0.809
Sustainable innovations (SI)	
SI1	0.902
SI2	0.876
SI3	0.859
SI4	0.844
SI5	0.821
Need for achievement (NA)	
NA1	0.911
NA2	0.873
NA3	0.859
NA4	0.84
NA5	0.811
NA6	0.805
Community engagement (CE)	
CE1	0.884
CE2	0.863
CE3	0.849
CE4	0.831
CE5	0.822
CE6	0.813
Sustainable entrepreneurship (SE)	
SE1	0.921
SE2	0.918
SE3	0.895
SE4	0.844
SE5	0.832
SE6	0.819
SE7	0.808

Table 3. Internal consistency, reliability of constructs and discriminant validity of constructs

Tests	Sustainability mission	Sustainable innovations	Need for achievement	Community engagement	Sustainable entrepreneurship
Cronbach's alpha	0.821	0.832	0.826	0.855	0.822
Composite reliability	0.934	0.927	0.951	0.956	0.941
Average variance extracted	0.738	0.719	0.765	0.782	0.694
Discriminant validity					
Sustainability mission	*0.859*[a]	0.274	0.110	0.285	0.117
Sustainable innovations	0.321	*0.848*[a]	0.155	0.304	0.194
Need for achievement	0.184	0.277	*0.875*[a]	0.363	0.318
Community engagement	0.284	0.326	0.329	*0.884*[a]	0.372
Sustainable entrepreneurship	0.126	0.183	0.374	0.205	*0.833*[a]

Note(s): [a]show main diagonal values indicating square root of each construct

Table 4. Goodness of fit and assessment of structural model

Parameters			Values
Chi square/degree of freedom (χ2/df)			2.45
Goodness of fit index (GFI)			0.911
Adjusted goodness of fit index (AGFI)			0.93
Comparative fit index (CFI)			0.918
Normed fit index (NFI)			0.913
Root means square error of approximation (RMSEA)			0.066
Relationships	f^2	Q^2	R^2
Sustainability mission → sustainable entrepreneurship	0.572	0.363	0.609
Sustainable innovations → sustainable entrepreneurship	0.688	0.185	0.726
Need for achievement → sustainable entrepreneurship	0.788	0.206	0.756
Community engagement → sustainable entrepreneurship	0.695	0.190	0.704

should not be lower than 0.90, and RMSEA should be less than 0.08. Therefore, all indices fell within the threshold limits, indicating model fitness for further analysis. Similar parameters were also adopted by Su *et al.* (2023), Ma *et al.* (2023), and Pan *et al.* (2024). The predictive capacity of the structural model was assessed by measuring the R^2 (Sarstedt *et al.*, 2014). All relationships in the structural model exhibit an R^2 in the range of 0.609–0.785, which indicates that the variables have moderate to substantial relationships, indicating the good predictive capacity of the model. A Q^2 value greater than 0 confirmed the predictive relevance of the path model for a particular dependent variable.

The effect size (f^2) provides information about the effect of the variables on the dependent variables in the structural model. The current study measures the effect size of the SM, sustainable innovations, need for achievement and CE on SE. A score of f^2 lower than 0.02 indicates an effect, while values > 0.02, >0.15 and > 0.35 represent small, medium and large effect sizes, respectively.

Path analysis

The non-parametric bootstrapping method (Wetzels *et al.*, 2009) was used to assess the impact of different constructs on SE. The findings reveal a significant positive impact of SM ($\beta = 0.137$, $p < 0.01$), SIs ($\beta = 0.164$, $p < 0.01$), need for achievement ($\beta = 0.093$, $p < 0.01$) and CE ($\beta = 0.363$, $p < 0.01$) on SE (Table 5). This implies that organizational mission, green innovations, entrepreneurial motivation and civic engagement are crucial for fostering sustainable ventures. The PLS-SEM confirmed all the hypothesized relationships of the study (Figure 1).

Table 5. Path analysis

Hypothesis	Paths	Beta-value	Standard error	*t*-value
H1	Sustainability mission → sustainable entrepreneurship	0.137	0.035	3.892
H2	Sustainable innovations → sustainable entrepreneurship	0.164	0.041	4.007
H3	Need for achievement → sustainable entrepreneurship	0.093	0.025	3.720
H4	Community engagement → sustainable entrepreneurship	0.363	0.033	10.985

Note(s): $p < 0.01$ when *t*-values is greater than 2.32

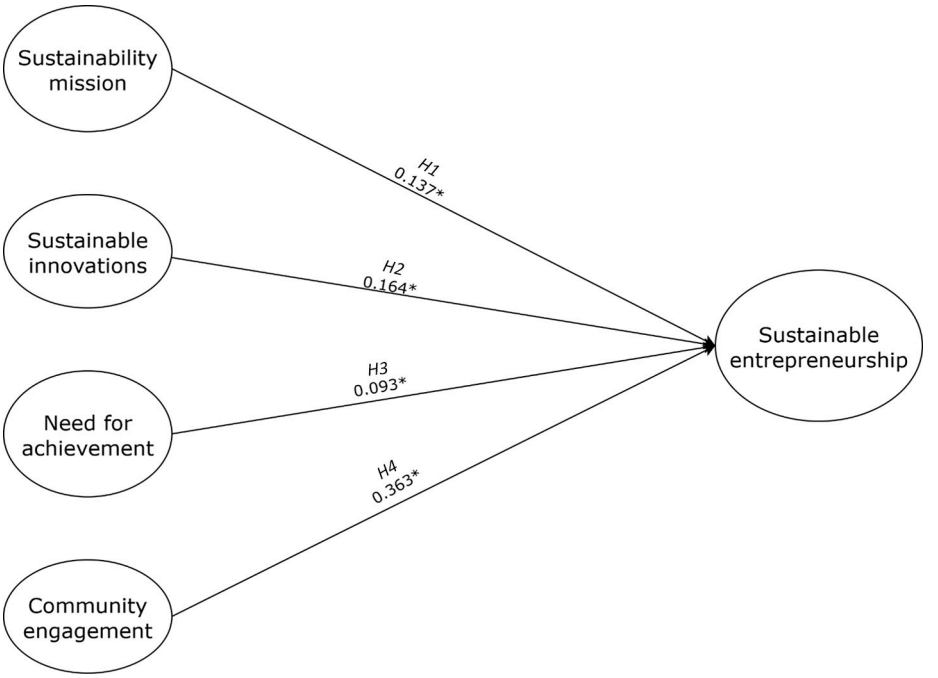


Figure 1. Complete Empirical Model
Note(s): * Indicates the significance at 1%

Discussion

Business activities majorly affect the climate and cause ecological degradation. By using economic resources, entrepreneurial activities contribute significantly to economic growth and affect the environment and society. Therefore, SE is crucial to promote sustainable development through the adoption of sustainable business practices. However, entrepreneurs' commitment to sustainability is the core element of SE. Similarly, innovative solutions, along with intrinsic achievements, also greatly affect the development of SE. The business model, which integrates social and environmental responsibilities, creates viable economic value, societal equity and low environmental impact, enhancing community well-being. Thus, the SM, SIs, need for achievement and CE enable entrepreneurs to create sustainable solutions that lower societal and environmental challenges and strengthen SE.

The findings indicate a strong positive impact of a SM on SE, implying that entrepreneurs with a strong commitment to sustainability define their core values and business operations, to integrate social and environmental responsibilities. This finding is in line with Duan and Yang (2024), who also found a positive role of SM in developing the social enterprises' sustainability. This reinforces the findings of this study, where the SM promotes SE. Similarly, Ditah *et al.* (2024) also described that when an entrepreneur integrates a SM into their business, they have a higher probability of executing sustainable business practices to create sustainability. Similarly, the SM encourages entrepreneurs to develop sustainable practices that reduce environmental impacts and increase social welfare. Entrepreneurs with

a strong focus on sustainability can develop products that fulfill societal needs (York and Venkataraman, 2010) and meet market demand. Sheldon and Lüdeke-Freund (2022) also pointed out that entrepreneurs with a SM develop strategies and business practices that positively contribute to society and the environment.

The study revealed that SIs are an important factor that significantly contributes to SE. Diaz (2023) also demonstrates that SIs help entrepreneurs to effectively tackle environmental and social challenges while maintaining long-term profitability. Fernandes *et al.* (2023) endorse the positive role of SIs in fostering the sustainable growth of firms. In addition, Ayandibu and Ayandibu (2024) stated that the integration of SIs in business promotes collaboration, the adoption of green technologies, and the development of a business model that focuses on social well-being and environmental sustainability. Moreover, Vig (2023) acknowledges the role of SIs in achieving sustainable ventures. Therefore, SIs substantially promote SE by adopting environmentally oriented technologies and energy and resource-efficient practices, which reduce the environmental impact of business activities, minimize waste and improve resource-use efficiency.

McClelland (1965) presented the theory of achievement, which indicates that individuals with a strong need for achievement are more likely to present entrepreneurial behavior. Entrepreneurs with a strong need for achievement and vision are more likely to be concerned with society, and they focus extensively on finding effective, ethical solutions to environmental and social challenges (Shane *et al.*, 2003). Therefore, entrepreneurs with a great need for achievement set goal-specific tasks that can generate beneficial changes by targeting certain societal groups (Argade *et al.*, 2021).

The findings indicate a strong positive impact of CE on SE. This implies that entrepreneurs with high CE are more likely to build trust, legitimacy and strengthen the local network, which is crucial for sustainable business growth. CE enables entrepreneurs to align innovations with community needs while considering environmental and social sustainability. Kim *et al.* (2023) described that CE is crucial for organizational sustainability. Our findings are also in line with Sharma and Bhat (2023), who described that CE plays a crucial role in the sustainable tourism business development by fostering social and environmental innovations. The study has theoretical, societal implications and policy implications.

Theocratical implications

Considering the theoretical discourse on SE, the findings are aligned with the insights of institutional theory and the resource-based view. SM and NA integrate insights from institutional theory, which supports the idea that sustainable or green entrepreneurs are affected by cognitive and normative factors. These factors include personal values and societal and environmental norms, which align with the framework of institutional pillars (Scott, 2013). This reinforces the importance of institutional or organizational aspects in shaping SE. Therefore, the findings confirm that individual-level psychological drivers, such as a SM and need for achievement, strongly translate institutional pressure into sustainable entrepreneurial actions while maintaining societal norms. This also indicates that complying with institutional missions, personal motivational factors and broader societal expectations are important for fostering SE.

Moreover, this study provides new insights into the resource-based view, as SIs have emerged as a crucial factor in developing SE. This demonstrates that environmentally oriented innovations act as a strategic internal resource that develops SE, which further creates sustainable and competitive advantages in the market (Barney, 1991; Madhani, 2010). This study extends this view by emphasizing SIs as a distinct strategic resource highly

valued across different institutional environments. The previous resource-based view merely considers innovations as a resource in entrepreneurial activities (Barney, 1991). However, in this study, based on cross-country analysis, innovation must be environmentally friendly to achieve sustainable impact and competitive advantages. This insight refines the resource-based review by integrating SIs as a unique capability for creating long-term advantages and market differentiation.

Therefore, the empirical findings of this study across 20 economies substantially extended these theoretical aspects by emphasizing their applicability in diversified institutional environments. It also highlights the alignment of our construct with important aspects of both theories by specifying the roles of individual-level psychological and motivational factors and resource capabilities in developing SE. Thus, the study contributes to the theory by indicating that the interaction among personal motivations, resource-based capabilities and institutional norms contributes to fostering SE more than any single factor. This provides a comprehensive understanding of how a venture or business activity is initiated and sustained.

Societal implications

The findings of this study have significant societal impacts in the Global South, where a large population faces sustainability challenges. Green entrepreneurs can create locally relevant solutions that address environmental and social issues. These efforts can lead to job creation, particularly in underserved communities, and foster economic resilience. CE ensures that the benefits of SE are inclusive, empowering local populations and reducing inequalities. Ultimately, these green ventures help improve living standards, raise environmental awareness and support long-term sustainable development in the Global South. The findings demonstrate that SI, mission-driven leadership and entrepreneurial motivation foster green ventures, driving industrial development and innovative business models that support sustainable growth. Thus, this study emphasizes SI and entrepreneurship, which directly aligns with the core objectives of SDG 9 (Industry, Innovation and Infrastructure).

Policy implications

As the findings indicate that the sustainable mission positively contributes to SE, the government must encourage entrepreneurs to disclose their SM publicly, which will attract environmentally conscious customers with clear and highly strategic directions toward environmental sustainability. Therefore, the government must provide clear guidelines for disclosing sustainability goals. Moreover, SIs also significantly contribute to SE; therefore, entrepreneurs must be rewarded and encouraged to adopt environmentally friendly innovations. For this purpose, policymakers may offer innovation grants, tax credits, create fast-track approval systems and procurement preferences. The need for achievement can be fostered through role-model exposure, educational programs and training, which can encourage entrepreneurs to become green entrepreneurs. Sustainable ventures result in long-term environmental benefits. The government can develop effective educational policies, such as mandating the inclusion of entrepreneurship courses with a sustainability focus, building incubation centers and offering grants to students for green start-ups.

Conclusions

SE is mainly focused on the global context and has opened a new field of debate to achieve sustainable development. SE is expected to integrate sustainable initiatives to address social and environmental challenges, along with sufficient economic benefits. Therefore, an entrepreneur's mission, along with the development and adoption of sustainable initiatives and strong self-achievement drives, can significantly affect SE. Thus, this study aimed to analyze the direct

impact of SM, SIs, need for achievement and CE on SE. PLS-SEM results revealed a significant positive impact of all these factors on SE. This implies that entrepreneurs who integrate green practices, develop green solutions and engage with stakeholders are more likely to adopt sustainable entrepreneurial business activities in their operations.

Limitations of the study and future research directions

The following limitations must be considered when generalizing the findings of this study. This study could not categorize entrepreneurs according to their economic development, which can open a new door for future studies. Moreover, the study used a non-probability sampling technique (snowball) through social networks to collect data from entrepreneurs, which may lead to self-selection bias. Therefore, future studies should use probability sampling to decrease the likelihood of self-selection bias. This study only focused on green entrepreneurs regardless of their primary operating sector, and further study could consider sectoral variation to obtain more precise insights into sector-based SE. Moreover, further studies can extend Isenberg's model by integrating digital infrastructure and policy incentives. In addition, this study does not account for possible differences between countries or sectors. Future studies could focus on a specific sector within different countries to overcome this limitation.

Ethics statement

The study was approved by the University of Education Lahore, Pakistan (2024–1089).

Informed consent

Informed consent was obtained from all individual participants included in the study.

Author contribution

Han Cheng: Conceptualization; Data curation; Formal analysis; Funding acquisition; Investigation; Methodology; Writing – original draft; Writing – review & editing. Changyi Min: Conceptualization; Data curation; Formal analysis; Funding acquisition; Visualization; Writing – original draft; Writing – review & editing. Shamsheer ul Haq: Conceptualization; Data curation; Supervision; Visualization; Writing – original draft; Writing – review & editing. Pomi Shahbaz: Data curation; Project administration; Resources; Software; Validation; Writing - original draft; Writing – review & editing.

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Data availability

The entire dataset supporting the findings of this study is published within the article.

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