



An empirical contribution towards measuring Sustainability-oriented Entrepreneurial Intentions: A Study of Indian Youth

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Abstract

A rigorous exploration of the available literature outlined a theoretical and empirical gap related to the identification of the key antecedents of Sustainability-oriented Entrepreneurial Intentions and the availability of a comprehensive scale for measurement of Sustainability-oriented Entrepreneurial Intentions of an individual. Therefore, this study aimed to identify the antecedents of Sustainability-oriented Entrepreneurial Intentions from an exhaustive review of the literature and then use the antecedents to propose a scale for measuring Sustainability-oriented Entrepreneurial Intentions. Significant findings from the available literature were collated, data was collected through a structured survey of youth in India, and appropriate statistical procedures for Dimension Reduction using Principal Component Analysis on Statistical Package for Social Sciences v28 were applied. Finally, Internal Reliability and Face validity of the proposed scale was also tested with responses obtained from experts. A comprehensive 31-item measurement scale of Sustainability-oriented Entrepreneurial Intentions was structured based upon the Dimension Reduction results. Aligned with the Sustainable Development Goals adopted by the United Nations in 2015, practitioners and researchers have advanced the need to promote a new perspective of entrepreneurship: Sustainable Entrepreneurship. Given that it is empirically well established that intentions lead to behaviour, it is imperative to study Sustainability-oriented Entrepreneurial Intentions in order to promote Sustainable Entrepreneurship Behaviour, especially among youth. The findings can help policymakers and educationists design strategies to expand the adoption of Sustainable Entrepreneurship in the population by strengthening the identified antecedents.

Keywords Sustainability-oriented Entrepreneurial Intentions · Sustainable Entrepreneurship · Sustainable Development · Dimension Reduction · Principal Component Analysis

Abbreviations

ALT Altruism
ATS Attitude Towards Sustainability

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CMB	Common Method Bias
CMV	Common Method Variance
EI	Entrepreneurial Intentions
ENVIR	Environmental Values
EXR	Extrinsic Rewards
GSE	General Self-Efficacy
HEI	Higher Education Institute
INR	Intrinsic Rewards
PCA	Principal Component Analysis
PED	Perceived Entrepreneurial Desirability
PEF	Perceived Entrepreneurial Feasibility
SDG	Sustainable Development Goals
SE	Sustainable Entrepreneurship
SEI	Sustainability-oriented Entrepreneurial Intentions
SPSS	Statistical Package for Social Science
TPB	Theory of Planned Behaviour

1 Introduction

In order to alleviate the ramifications of injudicious industrialisation, urbanisation, and exploitation of natural resources over the course of economic progress all over the world and to prevent further depletion of the global environmental and societal quality, the United Nations adopted 17 Sustainable Development Goals (SDGs) in the year 2015. These 17 global goals provide a blueprint for innovative and prudent use of available natural resources to promote sustainable development. The SDGs are aimed at ensuring that Economies strike the right balance between economic gains and environment and societal well-being.

Aligned with the SDGs, practitioners and researchers have advanced a new perspective of entrepreneurship in the last decade: Sustainable Entrepreneurship (SE). According to Fidlerová et al. (2022), SE is a creative form of entrepreneurship that addresses and manages the economic, environmental, and societal aspects of value creation. Given the emphasis on SDGs, the need to promote an ecosystem for the expansion of SE cannot be overemphasized.

Kumar and Shukla (2019) presented Entrepreneurship as an intentional endeavour. Ergo, amidst the paradigm shifts in Entrepreneurship Research and Practice, the variable, 'Entrepreneurial Intentions' remained relevant throughout the evolution of Entrepreneurship studies. Belchior and Lyons (2021), Farrukh et al. (2021), and Wang et al. (2021) have empirically established that 'Entrepreneurial Intentions' is a significant variable in the conceptualisation of Entrepreneurial Behaviour and theorising Entrepreneurship as a field of research. Hence, within the ambit of Sustainable Entrepreneurship research, there is a need to investigate the intentions to undertake Sustainable Entrepreneurship which is referred as, 'Sustainability-oriented Entrepreneurship Intentions' (SEI), in contemporary entrepreneurship research. SEI is, "A mental state that shows conviction and commitment by a person to set up in the future a new business venture that creates economic, social and environmental values" (Agu et al., 2021).

Taking the agenda for research on SEI forward, it may be observed that there is an urgent need for developing and validating a scale for measuring SEI, especially among

youth. Therefore, in this background this research aims at developing a scale for measurement of Sustainability-oriented Entrepreneurial Intention. The population for this study is the Youth in India. According to Statista (2022), the youth unemployment in India in 2021, is as high as 28.26% and entrepreneurship is one of the viable solutions for this unemployment problem. The current SDG score of India in 2021 is 66 (Statista, 2021), which indicates a substantial gap in achieving a holistic and sustainable ecosystem for progress of the country. Recent scholarly contributions by Boateng et al. (2022) and Iduseri et al. (2022) have also highlighted the significance of the role of the youth in attainment of the SDGs.

The presentation of this research work begins with an outline of the research gap, followed by a narrative on the literature encapsulating the identification of the key antecedents of SEI. This is followed by the Research Methodology and a summary of the identified scales used for measurement of the variables. Thereafter, a detailed presentation of the empirical results obtained from Dimension Reduction using Statistical Package for Social Sciences (SPSS) v28 is included. Further, the finding and discussion section includes the overall findings of the study including the results of the test of internal reliability and face validity of the proposed SEI measurement scale. The Scope of Future Research and Limitations are included at the end.

2 Research gap

Given the global emphasis on Sustainable Development, it is imperative to expand the adoption of Sustainable Entrepreneurship among youth. In order to achieve this goal, policy makers and educationists need to better understand the intentions leading to Sustainable Entrepreneurship Behaviour. Measurement of the Intention (SEI) will help in achieving this purpose and in designing strategies for promotion of Sustainable Entrepreneurship in the population.

Therefore, the central theme of this research work revolves around the research question, "How to measure the SEI of an individual?" Scholarly work by Pascucci et al., (2022) and Yasir et al., (2021) led to the conclusion that the construct SEI has stemmed from the concept of Entrepreneurial Intentions. The available literature outlines several scholarly contributions related to the measurement of the construct, "Entrepreneurial Intentions" (Dinis et al., 2013; Lee et al., 2011; Liñán & Chen, 2009; Nguyen et al., 2019; Ozgul & Kunday, 2015; Thompson, 2009; Valliere, 2015).

However, a rigorous exploration of the available literature outlined a theoretical and empirical gap related to identification of key antecedents of SEI and availability of a comprehensive scale for measurement of SEI of an individual. The current research on SEI presents unclear and scattered inferences on its antecedents. The prominent antecedents identified from the scant literature available on SEI include Altruism (Agu et al., 2021; Kummitha & Kummitha, 2021; Romero-Colmenares & Reyes-Rodríguez, 2022; Thelken & Jong, 2020; Yasir et al., 2021), Intrinsic Rewards (Jamal Ali & Anwar, 2021; Sher et al., 2020; Srivastava et al., 2022; Thelken & Jong, 2020), Extrinsic Rewards (Jamal Ali & Anwar, 2021; Vuorio et al., 2017), Job Security (Dao et al., 2021; Hoogendoorn et al., 2019), Self-efficacy (Hussain et al., 2021; Sher et al., 2020), and Environmental Values (Nuringsih et al., 2019; Pascucci et al., 2022; Prado et al., 2022; Saleem et al., 2018).

Other recent scholarly works by Agu & Nwachukwu, 2020; Dickel & Eckardt, 2020; Shah et al., 2020 have empirically highlighted a positive impact of the constructs of the

Theory of Planned Behaviour (i.e. Attitude Towards Sustainability, Perceived Entrepreneurial Desirability, and Perceived Entrepreneurial Feasibility) on SEI.

Therefore, this study aims to identify the antecedents of SEI from an exhaustive review of the literature and then use the antecedents to propose a scale for measuring SEI. The scope of this research work is not only limited to the scholarly contribution, but the identified antecedents can also aid in designing appropriate structural interventions in the domain of education and governance for fostering a thriving Sustainable Entrepreneurial Ecosystem.

3 Literature review

This section presents a review of the existing literature related to SEI and its antecedents. The section begins with an explanation of the SEI construct, followed by a discussion on the significant theories explaining Entrepreneurial Intentions (EI). It is evident from literature that SEI as a construct has stemmed out of EI (Pascucci et al., 2022; Yasir et al., 2021). The latter part of the section discusses the literature available on the antecedents of SEI.

3.1 Sustainability-oriented Entrepreneurial Intention

According to Srivastava et al. (2022), Sustainability-Oriented Entrepreneurial Intention (SEI) is an intention associated with a significant consideration for social and environmental issues for taking up an entrepreneurial venture. It is also considered the individual's likelihood to practice sustainable entrepreneurship (Sendawula et al., 2018). SEI has gained its relevance in the last five years; prior to this, the related phenomenon of Entrepreneurial Intentions (EI) was found to be the theme for many studies in entrepreneurial research. The fundamental concepts related to SEI are the theories that explain the Entrepreneurial Intention of an individual (Nuringsih et al., 2019; Pascucci et al., 2022; Yasir et al., 2021). Lu et al. (2021) theorized EI as a sub-set of the variable, 'Intentions', derived from the field of psychology. EI is the state of mind that directs and guides the entrepreneur's actions towards developing and implementing new business concepts (Bird, 1988).

Two disciplines that have contributed to the idea of EI are Social Psychology and Entrepreneurship. Vroom (1964) propounded the Expectancy Theory, one of the earliest theories in understanding an individual's behaviour. The theory states that one strives for better performance if one expects a rewarded outcome. This theory has contributed extensively to the field of Organizational Behaviour and helped researchers understand the concept of EI and entrepreneurial motivation (Barba-Sánchez & Atienza-Sahuquillo, 2018). Later, Shapiro and Sokol (1982) proposed the Entrepreneurial Event Model. They empirically established that an individual's EI is predicted by Perceived Desirability, Perceived Feasibility, and Propensity to Act. Additionally, Ajzen (1991) outlined that an individual's intention to behave in a certain way is directed by Attitude towards Behaviour, Social Norms, and Perceived Behavioural Control. This Theory of Planned Behaviour by Ajzen (1991) has also been used to explain an individual's EI.

Building upon the existing Theory of Planned Behaviour by Ajzen (1991), Krueger & Carsrud (1993) empirically explained how Attitude towards Venture Creation, Social Norms, and Perceived Behavioural Control impacts an individual's EI and leads to a comprehensive understanding of the entrepreneurial behaviour of an individual. Boyd and

Vozikis (1994) developed the Entrepreneurial Intention Model (EIM). This model outlines that personal values and structural environment factors direct an individual's EI. The model was built upon the Entrepreneurial Intentionality Model proposed by Bird (1988). This model highlights the role of an individual's self-efficacy in determining their EI.

3.2 Antecedents of Sustainability-oriented Entrepreneurial Intentions

The antecedents of SEI can be found in scattered evidences based from both qualitative and quantitative studies. A collated discussion based on a comprehensive review of all such literature is presented in this section.

Scholarly works by Nişu-Antonie et al. (2022), Pascucci et al. (2022), and Yasir et al. (2021) have propounded that the construct of SEI has stemmed from the construct of entrepreneurial intention. SEI is a mindset that integrates entrepreneurial intention with environmental and social aspects of value creation (Zhu et al., 2022). Therefore, understanding the construct of SEI requires an expansive exploration of the sociological and psychological aspects of the intention-behaviour mechanism (Truong et al., 2022), Thus indicating the need to explore the personal and work value system of the individuals.

Scholarly work by Stirzaker et al. (2021) identifies Altruism and human interaction as fundamental reasons for individuals to take up unconventional forms of entrepreneurship. The theoretical work by Ranville and Barros (2021) outlines the evolution and expansion of utilities for human welfare as background for developing entrepreneurial ventures with a social and sustainable outlook. Rodrigues and Hewig (2021) have referred to Altruism as a multidisciplinary variable developed from the disciplines of Biology, Sociology, Psychology, and Sociology. Altruism is the action taken towards the welfare of others (Pfattheicher et al., 2022). The motivation for Altruism stems from human pro-social behaviour, where the actions are situation-specific and directed towards the well-being of others (Rodrigues & Hewig, 2021). Lyons et al. (2010) established that an individual's altruistic behaviour encourages them to keep safe the environment surrounding them and the people living there, which is the basis of Sustainable Entrepreneurship.

Further, Studies of sustainable entrepreneurship have shown that individuals choose empathy-based Altruism. This suggests that their primary altruistic drive is to help others in need rather than pursue their own goals (Agu et al., 2021; Saleem et al., 2018; Thelken & Jong, 2020; Vuorio et al., 2017). Recent empirical studies by Kummitha & Kummitha, 2021; Thelken & Jong, 2020; Vuorio et al., 2017; Yasir et al., 2021 have empirically established a positive relationship between Altruism and the SEI of an individual.

Another set of antecedents of an individual's SEI is based on Incentive theories (Nhemachena & Murimbika, 2018). Extrinsic Rewards are strongly associated with an individual's attraction to personal gain. Therefore, a person with such values must be driven by status and monetary rewards (Jamal Ali & Anwar, 2021). As extrinsic rewards are closely related to economic value creation, they are also likely to have a positive relationship with an individual's SEI (Sher et al., 2020; Vuorio et al., 2017).

According to Ahmad (2018), Intrinsic Rewards are defined as an individual's growth orientation which is an outcome of the satisfaction derived from the fulfilment of innate psychological needs. Recent scholarly work by Srivastava et al. (2022) highlights the key variables of intrinsic rewards (socio-emotional feelings, pro-environmental values, and community feeling aspirations) that significantly impact an individual's SEI. Furthermore, Thelken and Jong (2020) identified pro-social and pro-environmental cognitive styles to be associated with desire for intrinsic rewards among individuals. These empirically

established value sets are directly associated with the social and environmental aspects of Sustainable Entrepreneurship (Thelken & Jong, 2020). Therefore, from the available literature, we can conclude that there is a positive relationship between Intrinsic Rewards and SEI.

Existing literature also highlights low value for Job Security as a key antecedent of SEI. According to Hur (2019), Job Security is defined as a legal contract between the employer and employee that ensures the employee's work continuance and professional growth. Delanoë-Gueguen and Liñán (2018) identified job security and perceived risk as significant variables for understanding the entrepreneurial career choices of an individual. Individuals choosing entrepreneurship as their career tend to value job security less than those employed in companies (Vuorio et al., 2017). Dao et al. (2021) empirically established that perceived risk positively relates to the need for job security.

Need for Job Security has been found to have a significant negative relationship with an individual's entrepreneurial intentions (Dao et al., 2021). Moreover, with the need to identify and exploit the imperfections and failures of the environment and society, individuals who consider Sustainable entrepreneurship as their career choice tend to be more aware of the institutional and market risks and perceive the associated risk with this unconventional form of entrepreneurship to be low (Hoogendoorn et al., 2019). Recent empirical evidence from the studies by Jamal Ali and Anwar (2021) and Sher et al. (2020) establishes the negative relationship between the value of Job Security and the SEI of an individual, which implies that low value for Job Security is a likely antecedent of SEI.

There are evidences in literature that indicate that an individual's self-efficacy may be an antecedent of SEI. Self-efficacy is the "conviction that one can successfully execute the behaviour required to produce a certain outcome" (Bandura, 2006). It is a task-specific phenomenon that considers personality as an internal constraint and the environment as an external constraint (Boyd & Vozikis, 1994). Recent scholarly works by Elnadi and Gheith (2021) and Hassan et al. (2020) have empirically propounded self-efficacy as one of an individual's significant drivers of entrepreneurial intentions. Empirical evidence shows that an individual with a higher degree of self-efficacy is more driven towards self-employment/ entrepreneurship (Hussain et al., 2021; Sher et al., 2020). Further, Kantén et al. (2016) have empirically drawn a meaningful relationship between an individual's self-efficacy and career self-exploration. From the understanding of existing literature, a positive relationship between Self-efficacy and SEI can be assumed.

Additionally, the existing literature also highlights Environmental Values as one of the antecedents of SEI of an individual. Environmental values describe a character's altruistic conduct and tendency to be concerned with the environment and different individuals in society with enthusiasm and passion (Lyons et al., 2010). Empirical evidence from the scholarly work by Li et al. (2021) outlines a direct relationship between Environmental Values and Environment Protection Behaviour.

Often SE is defined as growing consciousness towards societal and environmental well-being and putting efforts into establishing ventures to exhilarate it (Nuringsih et al., 2019). According to Sargani et al. (2020), the primary concern of any sustainable entrepreneurial venture is to cater to the needs of the natural environment set up. Additionally, with the growing environmental and societal degradation, it has become apparent that there is a need to stir the SEI of an individual and promote the SE ecosystem (Saleem et al., 2018). Further, Shepherd and Patzelt (2011) reported empirical evidence supporting the notion that the plausibility of identifying a sustainable entrepreneurial opportunity will be higher with the appropriate attitude towards it. Peng et al. (2021) also corroborated that environmental values act as a key antecedent for examining an individual's SEI.

From 2000 to 2020, the Theory of Planned Behaviour (Ajzen, 1991) has been appor-tioned to alleviate the conceptual background of studies related to entrepreneurial intentions (Tingting et al., 2022). While exploring the available literature on an individual's SEI, relevant evidence was found supporting that the variables of the Theory of Planned Behaviour (TPB) act as antecedents of SEI. The empirical study conducted by Ajzen (1991) established that an individual's specific behaviour disposition results from their intention. The TPB variables, namely Attitude towards Sustainability (ATS), Perceived Entrepreneurial Desirability (PED), and Perceived Entrepreneurial Feasibility (PEF), correspond to the core agenda of Sustainable Entrepreneurship that stresses contributing to solving societal and environmental problems with an economically successful business (Schaltegger & Wagner, 2011).

Attitude towards Sustainability addresses all three critical aspects of SE, i.e. concern for social and environmental well-being while creating economic value (Vuorio et al., 2017). Perceived Entrepreneurial Desirability sketches the degree to which a specific entrepreneurial career is alluring to an individual (Krueger, 1993; Shapero & Sokol, 1982). It is indicative of the ambition for economic value creation (Vuorio et al., 2017). Perceived Entrepreneurial Feasibility is a set of belief systems and skill sets acceptable by an individual to take up entrepreneurial activities (Jamal Ali & Anwar, 2021; Krueger, 1993; Shapero & Sokol, 1982).

Recent scholarly works by Agu et al., (2021), Agu and Nwachukwu (2020), Barral et al., (2018), Dickel & Eckardt (2020), Ebdane and Samar (2019), Kedmenec and Strašek (2017), Ozaralli and Rivenburgh (2016), Rivenburgh (2016), Shah et al., (2020), and Vourio et al., (2017) have empirically highlighted a positive impact between the variables of TPB (i.e. ATS, PED, and PEF) and SEI.

As mentioned earlier in this paper rigorous exploration of the available literature on Sustainable Entrepreneurship outlines a theoretical and empirical gap especially related to identification of key antecedents of SEI and availability of a comprehensive scale for measurement of SEI of an individual. The current research on SEI presents unclear and scattered inferences on its antecedents. Therefore, this study aims to identify the antecedents of SEI from an exhaustive review of the literature and then use the antecedents to propose a scale for measuring SEI.

From the extensive review of literature, the key antecedents of an individual's SEI that were identified are Altruism, Intrinsic Rewards, Extrinsic Rewards, Job Security, Self-efficacy, Environmental Values, Attitude towards Sustainability, Perceived Entrepreneurial Desirability, and Perceived Entrepreneurial Feasibility. Hence the conceptual framework of this scale development research is presented in Fig. 1. The scope of this work is to identify the complete set of items that may be included in a scale for SEI measurement and then apply statistical dimension reduction and derive the final scale. Hence, significant findings from the available literature were collated and appropriate statistical procedures for Dimension Reduction using Principal Component Analysis (PCA) on SPSS v28 were applied. Further, the reliability and face validity of the proposed scale with reduced constructs was tested to examine its relevance and usability.

4 Methodology

The objective of this study is to propose a comprehensive scale for measurement of SEI. Figure 2 depicts the steps involved in developing the SEI measurement scale.

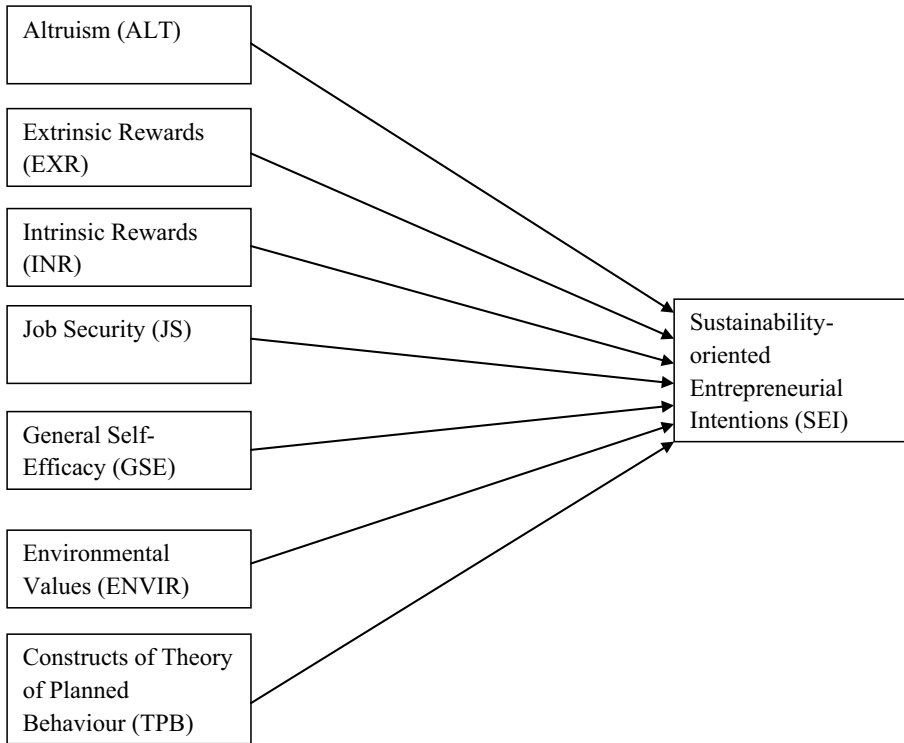


Fig. 1 Theoretical framework of the study

4.1 Scale identification

After a thorough review of the extant literature, the relevant scales were identified for the study. Table 1 highlights all the relevant scales identified for the key variables of this study.

For Altruism, the Self-Report Altruism (SRA) Scale by Rushton et al. (1981) was found apt for the study. The original scale had 20 items which were further reduced to a 9-item scale by Manzur and Olavarrieta (2021). This 9-item SRA Scale was finally adopted for the study as the population of the pre-test of the study was students enrolled in the master's programme of Human Behaviour. All the items were measured using a five-point Likert scale where 1 = Never and 5 = Always.

The scale developed by Dietz et al. (2002) for Extrinsic Motivation was found relevant for the study, as the scale has been validated by various researchers under different contextual settings (Plieninger et al., 2013; Vuorio et al., 2017; Yasir et al., 2021). There were four items on the scale, and the responses were solicited using a five-point Likert scale, where 1 = not very important and 5 = extremely important.

For Intrinsic Motivation, the scale developed by Twenge et al. (2010) was used as the scale has been widely validated among the population of different demographic and geographic profiles (Gabrielova & Buchko, 2021; Jung et al., 2021; Mahmoud et al., 2020; Maloni et al., 2019; Škerlavaj et al., 2018; Vuorio et al., 2017). These five items in the scale were measured using the five-point Likert scale with 1 being not very important and 5 being extremely important.

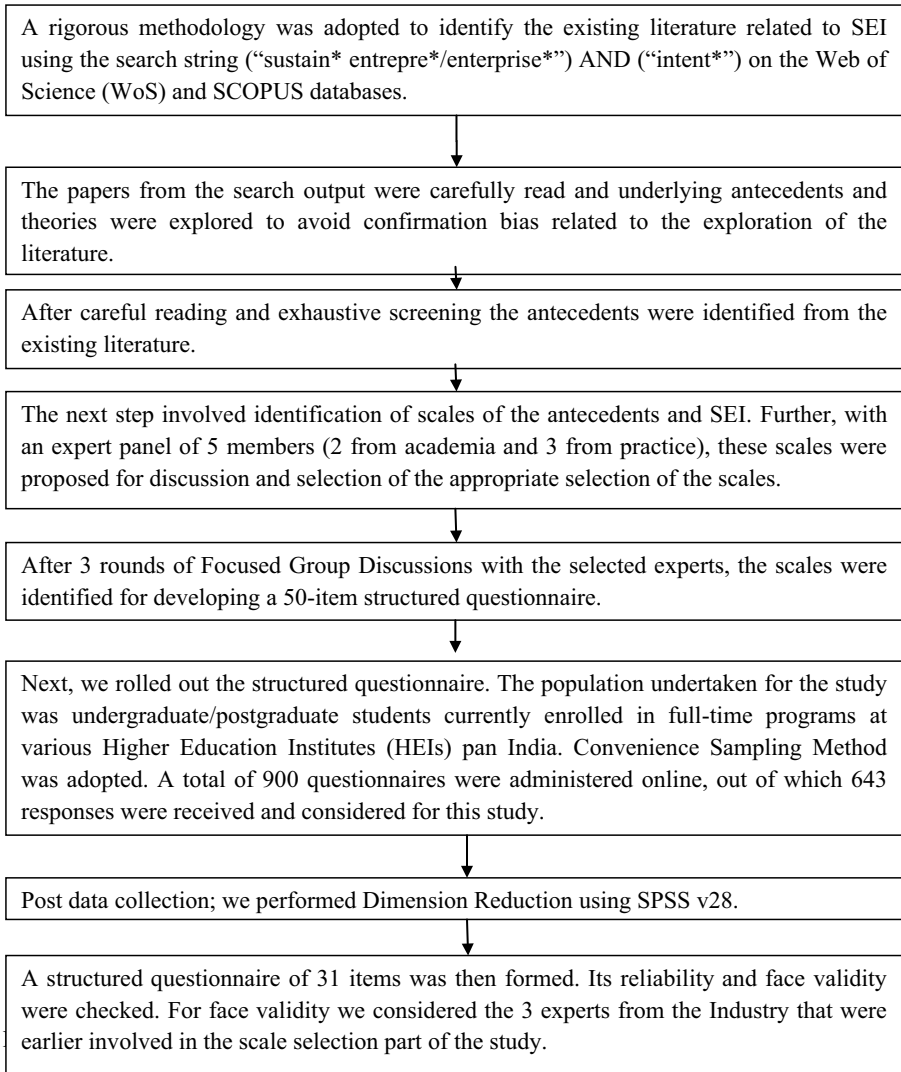


Fig. 2 Flow chart of research methodology

The experts’ feedback was taken in selecting the scale for Job Security, and finally, the scale developed by Twenge et al. (2010) was used. The three-item scale developed by Twenge et al., 2010 uses a five-point Likert scale, where 1 = not very important and 5 = extremely important.

The General Self-Efficacy of an individual was measured using an eight-item scale developed by Chen et al. (2001) as it has been widely used in the entrepreneurial research domain (Al-Ghazali & Afsar, 2021; Ritala et al., 2021; Uysal et al., 2022). All the scale items were measured using a five-point Likert scale, with 1 being strongly disagree with the statement and 5 being strongly agree.

The five-item scale developed by Mair and Noboa (2006) was adopted to measure the Environmental Values of individuals as the scale was developed in the Social

Table 1 Key scales identified for identified drivers

Name of the variable	Scales identified from the literature
Altruism	Altruism Scale (Akbaba, 1994) Self-Report Altruism (Rushton et al., 1981) Eysenck Personality Questionnaire (Eysenck & Eysenck, 1975) Maudsley Personality Inventory (Eysenck & Knapp, 1962)
Extrinsic Motivation	Extrinsic Rewards Scale (Dietz et al., 2002) Reward System Scale (Allen & Kilmann, 2001) The Situational Motivational Scale (Guay et al., 2000) Managerial Attitude and Performance Scale (Porter & Lawler, 1968)
Intrinsic Motivation	Intrinsic Motivation Scale (Twenge et al., 2010) The Situational Motivational Scale (Guay et al., 2000) Scale by Pelletier et al. (1997) Intrinsic Motivation Scale (Weissinger & Bandlos, 1995)
Job Security	Work Value Scale (Twenge et al., 2010) Job Security Index (Probst, 2003) Job Security Scale (Oldham et al., 1986) Job Content Questionnaire (Karasek, 1985)
General Self-Efficacy	The Student Radiographer Self-Efficacy Scale (Kitching et al., 2011) New General Self-Efficacy Scale (Chen et al., 2001) Competency Self-Efficacy Scale (Lapan et al., 1997) Missouri Guidance Competency Evaluation Survey (Gysbers et al., 1992a, 1992b) Perceived Self-Efficacy Scale (Bandura, 1977)
Environmental Values	Environmental Values Scale (Mair & Noboa, 2006) Environment Value Measurement Scale (Dunlap et al., 2000) Bjerke and Kaltenborn's (1999) Scale for Environmental Values Environmental Values (Gagnon Thompson & Barton, 1994)

Entrepreneurship Context. The items of this scale were measured using a five-point Likert scale, with 1 being not very important and 5 being extremely important.

Since the literature pertaining to the primary objective of the study also included the sub-variables of the Theory of Planned Behaviour, items related to the variables were included in the questionnaire. Attitude towards Sustainability was measured using the seven-point Likert scale developed by Liñán and Chen (2009). The four-item scale developed by Liñán & Chen (2009) was considered for measuring Perceived Entrepreneurial Desirability. Perceived Entrepreneurial Feasibility was measured using the scale developed by Krueger (1993).

An extended version of entrepreneurial intention scale used by Liñán and Chen (2009) for measuring Sustainability-Oriented Entrepreneurial Intentions was used in this study. The 5 items in this scale were measured using the five-point Likert scale with 1 being strongly disagree and 5 being strongly agree.

4.2 Sample design

4.2.1 Population determination

The population chosen for the study is youth in India. According to Statista (2021), the composite SDG score of India in 2021 is 66, which indicates a substantial gap in achieving the holistic, sustainable ecosystem of the country. Youth comprise 27% of the population of India (Chandra & Raikhola, 2021), which is the highest proportion of youth in the population among all countries of the world. Moreover, the unemployment rate among Indian Youth was 28.21% in 2021 (Statista, 2022). Therefore, it is imperative that the youth in India be encouraged to take up self-employment in order to reduce the unemployment rate. A sustainable Entrepreneurial Ecosystem can effectively act as a motivator for individuals to take up sustainability-oriented entrepreneurial opportunities. Thus, identifying key antecedents for SEI among the youth population is necessary. Additionally, the scholarly evidence indicates that Youth significantly contributes to attaining SDGs (Boateng et al., 2022; Iduseri et al., 2022). Therefore, youth were selected as the target population for this study.

4.2.2 Response rate

The Convenience Sampling Technique was employed. A structured questionnaire was sent to 900 undergraduate and post-graduate students who are currently enrolled in a programme at various HEIs in India (across various disciplines, like, arts, commerce, science, management, etc.) through email, out of which 643 usable responses were received, giving a response rate of 71.45%.

4.2.3 Sample size

The minimum sample size required for performing dimension reduction and factor analysis should be at least three times the number of questions in the structured questionnaire (Catell, 1978). Kline (1979) propounded that the sample size should be at least twice the number of variables when performing factor analysis. Another thumb rule proposed by Corney and Lee (1992) highlights that a sample size of 500 and above is considered very good for performing Dimension Reduction. Mundform et al. (2005) recommended that a 'variable-factor ratio' of 6 and above is considered acceptable for performing factor analysis. The sample size of 643 used for this study makes it statistically appropriate for conducting Dimension Reduction as per the recommendation of all the above references.

5 Data analysis

In this empirical study, the aim was to reduce the dimensions of the scales identified from literature and from the inputs received from experts, using Factor Analysis in SPSS v28. The preliminary steps of scale development have been adopted using the Dimension Reduction Steps suggested by Nguyen and Sholmes (2019). It includes the test of internal reliability of the data (Cronbach's alpha), statistical adequacy of the data

Table 2 Cronbach alpha's test

	ATS	PED	PEF	ALT	EXR	INR	JS	GSE	ENVIR	SEI
No. of items	2	4	5	9	4	5	3	8	5	5
Cronbach's alpha	0.775	0.788	0.789	0.797	0.786	0.767	0.795	0.764	0.763	0.763

to perform dimension reduction (KMO and Bartlett's test), and Dimension Reduction using Principal Component Analysis.

The principal objective of conducting Dimension Reduction is to remove redundant variables and retain significant variables imperative for the study (Kambhatla & Leen, 1997). Allee et al. (2022) have confirmed the relevance of using Principal Component Analysis for Dimension Reduction and Factor Analysis. In this study, as suggested by Hair et al. (2019), subsequent to dimension reduction the Face validity of the proposed scale was tested.

In future studies, Exploratory Factor Analysis and Confirmatory Factor Analysis can be conducted on the scale derived after conducting PCA for further validation.

5.1 Internal reliability

To test the statistical reliability of the collected data, Cronbach alpha was computed using SPSS 28.0. Table 2 shows the statistical reliability of the data collected as all the values for the variables are greater than 0.7 (Nunnally, 1978).

5.2 Common method bias

In the statistical computation of exploratory studies, method bias is a significant factor influencing variable robustness, accuracy, reliability, and validity (Jordan & Troth, 2019). Thus, to avoid the variances caused by the data collection instrument, Harman's One Factor Test for Common Method Bias (CMB) has been performed using SPSS v28. According to Fuller et al. (2016), in business research, Harman's One Factor Test can easily detect the level of biasness originating due to Common Method Variance (CMV). The computed value of the total percentage of variance is 23.953%. According to Podsakoff et al., 2012, the acceptable limit of CMB in social science research should not exceed the threshold of 50%.

5.3 Statistical adequacy to perform dimension reduction

K-M-O Bartlett's test was conducted to test the overall adequacy of the data for dimension reduction. The overall model competency for sampling adequacy was tested, and the results are tabulated in Table 3.

According to Kaiser (1974), the K-M-O value between 0.8 and 1 is considered adequate for Dimension Reduction. The computed K-M-O value is 0.821 and is statistically significant.

Table 3 K-M-O and Bartlett's test of sphericity

KMO and Bartlett's test	
Kaiser–Meyer–Olkin measure of sampling adequacy	0.821
Bartlett's test of sphericity	
Approx. Chi-square	4087.655
df	1225
Sig	0.000

5.4 Principal component analysis (PCA)

PCA is a statistical technique used in exploratory data analysis to facilitate dimension reduction by retaining the principal components. According to Hair et al. (2019), the steps for conducting a reliable dimension reduction using PCA begin with checking the anti-image correlation relation matrix and communalities. The next step includes retaining items with significant statistical values. Further, K-M-O and Bartlett's test of sphericity, anti-image correlation matrix, and communalities are re-tested to confirm the statistical adequacy of the samples and to facilitate retaining only significant items. The Total Variance Matrix and Rotated Component Matrix are generated in the last step to retain significant items after Dimension Reduction using PCA.

Table 4 represents the anti-image correlation value at $p < 0.01$ and the respective communalities of the items.

All the anti-image correlation coefficients showed a value > 0.5 , which is not indicative of the items to be dropped for the dimension (Kaiser, 1974). Communalities are the proportion of each variable's variance that the factors can explain. All the items with values ≥ 0.6 are to be retained (Beavers et al., 2013).

All the items with communalities < 0.6 were dropped (values underlined in Table 3). K-M-O and Bartlett's test of Sphericity was again performed to obtain the final items for the scale. The newly computed K-M-O value was reported as 0.832. The K-M-O value increased marginally, indicating that the dropped items have less significance in developing the scale for the measurement of the SEI of an individual (Kaiser, 1974). Additionally, all the values computed for anti-image correlation coefficients and communalities are significant and ≥ 0.6 (Beavers et al., 2013).

All ten components were retained in the Total Variance Matrix, with Eigen Values > 1 . As recommended by Hair et al. (2010) the factors with Eigen values > 1 are considered significant and should be retained. Table 5 shows the Total Variance Matrix with the Eigen values and rotated loadings of the factors.

Table 6 represents the rotated component matrix with the ten factors and the respective items retained for the construction of the scale to measure the SEI of an individual. Varimax Rotation Method was used to convert the variables of the study and their respective items into new factors.

Table 4 Anti-image correlation coefficient and communalities

Items	Anti-image correlation coefficient	Communalities
q1	0.874 ^a	<u>0.578</u> ^b
q2	0.773 ^a	0.729 ^b
q3	0.758 ^a	<u>0.383</u> ^b
q4	0.803 ^a	0.686 ^b
q5	0.782 ^a	0.756 ^b
q6	0.813 ^a	0.630 ^b
q7	0.695 ^a	<u>0.541</u> ^b
q8	0.640 ^a	0.692 ^b
q9	0.626 ^a	0.781 ^b
q10	0.876 ^a	<u>0.483</u> ^b
q11	0.700 ^a	<u>0.542</u> ^b
q12	0.752 ^a	<u>0.593</u> ^b
q13	0.821 ^a	0.620 ^b
q14	0.622 ^a	<u>0.500</u> ^b
q15	0.814 ^a	0.619 ^b
q16	0.715 ^a	<u>0.535</u> ^b
q17	0.735 ^a	<u>0.542</u> ^b
q18	0.730 ^a	<u>0.423</u> ^b
q19	0.731 ^a	<u>0.564</u> ^b
q20	0.619 ^a	<u>0.458</u> ^b
q21	0.625 ^a	0.608 ^b
q22	0.736 ^a	0.659 ^b
q23	0.774 ^a	0.673 ^b
q24	0.708 ^a	0.614 ^b
q25	0.858 ^a	<u>0.556</u> ^b
q26	0.876 ^a	<u>0.551</u> ^b
q27	0.862 ^a	0.699 ^b
q28	0.897 ^a	0.720 ^b
q29	0.876 ^a	0.666 ^b
q30	0.721 ^a	0.753 ^b
q31	0.736 ^a	<u>0.585</u> ^b
q32	0.717 ^a	0.806 ^b
q33	0.879 ^a	0.664 ^b
q34	0.883 ^a	0.619 ^b
q35	0.909 ^a	0.699 ^b
q36	0.869 ^a	0.684 ^b
q37	0.873 ^a	0.717 ^b
q38	0.797 ^a	0.631 ^b
q39	0.794 ^a	<u>0.522</u> ^b
q40	0.887 ^a	<u>0.554</u> ^b
q41	0.878 ^a	0.760 ^b
q42	0.837 ^a	0.774 ^b
q43	0.881 ^a	0.687 ^b
q44	0.893 ^a	0.767 ^b
q45	0.856 ^a	0.640 ^b

Table 4 (continued)

Items	Anti-image correlation coefficient	Communalities
q46	0.895 ^a	0.583 ^b
q47	0.826 ^a	0.703 ^b
q48	0.871 ^a	0.692 ^b
q49	0.835 ^a	0.725 ^b
q50	0.831 ^a	0.630 ^b

^aMeasures of sampling adequacy

^bExtraction method: principal component analysis

6 Findings

As indicated by results of the dimension reduction using PCA, all ten factors are found to be significant and are therefore retained and the number of items has been reduced to 31. Eighteen items were dropped after the analysis of values of communalities. Item 50 (q50) was dropped from the Rotated Component Matrix as the value of the component was < 0.6.

To test the reliability of the scale derived after the dimension reduction, Cronbach's alpha value was calculated using the same data set. Table 7 represents Cronbach's alpha value for the 31-item scale.

Face Validity is considered an estimate of the quality of the data collection tool or model (Nevo, 1985). To test the face validity of the scale, the questionnaire developed after dimension reduction was sent to the 3 Industry Experts involved in the scale selection process during the initial phase of the study. Three questions were presented to the experts, and their feedback was obtained. The questions were: "Are the components of the measure relevant to Sustainability-oriented Entrepreneurial Intentions of Indian Youth?"; "Does the measurement method seem useful for measuring Sustainability-oriented Entrepreneurial Intentions of an individual?"; "Is the measure seemingly appropriate for capturing the Sustainability-oriented Entrepreneurial Intentions?".

The feedback received from all three experts is enlisted in Table 8.

7 Discussion

The scope of this study covers the aspects of identification of the antecedents of SEI and then applying statistical methods of dimension reduction to design and propose a measurement instrument for examining the SEI of an individual. As identified from the literature, the antecedents of SEI are Altruism, Intrinsic Rewards, Extrinsic Rewards, Job Security, Self-efficacy, Environmental Values, Attitude towards Sustainability, Perceived Entrepreneurial Desirability, and Perceived Entrepreneurial Feasibility. After conducting Dimension Reduction through Factor Analysis, all the factors then were retained, indicating the significance of these identified antecedents in examining the SEI of an individual.

It is critical to explore the SEI of an individual as the findings can act as the basis for regulatory authorities to promote a sustainability-oriented entrepreneurial ecosystem. Entrepreneurship has the potential to drive economic growth, create jobs, and improve the standard of living for individuals and communities. However, it is important that this growth is

Table 5 Total variance matrix

Component	Initial Eigen values		Extraction sums of squared loadings		Rotation sums of squared loadings	
	Total	% of Variance	Total	% of Variance	Total	Cumulative %
1	8.929	27.902	8.929	27.902	4.391	13.721
2	2.771	8.661	2.771	8.661	4.021	12.566
3	2.489	7.777	2.489	7.777	2.562	8.005
4	2.059	6.434	2.059	6.434	2.441	7.627
5	1.778	5.557	1.778	5.557	2.131	6.659
6	1.367	4.273	1.367	4.273	2.118	6.618
7	1.264	3.950	1.264	3.950	1.854	5.794
8	1.158	3.620	1.158	3.620	1.716	5.363
9	1.075	3.359	1.075	3.359	1.466	4.580
10	1.012	3.163	1.012	3.163	1.204	3.762
						74.696

Table 6 Rotated component matrixRotated component matrix ^a

	Component									
	1	2	3	4	5	6	7	8	9	10
q42	0.847									
q41	0.814									
q44	0.793									
q45	0.742									
q43	0.740									
q36		0.813								
q35		0.789								
q37		0.768								
q38		0.698								
q34		0.672								
q33		0.666								
q5			0.872							
q6			0.817							
q4			0.817							
q49				0.790						
q47				0.711						
q48				0.692						
q32					0.883					
q30					0.810					
q22						0.777				
q23						0.644				
q21						0.607				
q24						0.598				
q9							0.898			
q8							0.831			
q29								0.816		
q27								0.691		
q28								0.543		
q15									0.760	
q13									0.759	
q2										0.642

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization^a^aRotation converged in 10 iterations**Table 7** Cronbach's alpha values of retained items

Cronbach's alpha	No of items
0.880	31

sustainable and takes into account the needs of future generations. Research studies can help

Table 8 Experts' feedback for face validity

Expert 1	<i>"The questions are relevant for measuring the intent associated with Sustainable Entrepreneurship uptake of an individual. For developing economies like India, the understanding of drivers of intent related to Sustainable Entrepreneurship is the need of the hour to develop an ecosystem that not only promotes employment opportunities and economic development of the nation but also preserves nature and celebrates the culture of the country."</i>
Expert 2	<i>"The finally developed questionnaire by the authors of this study seems appropriate for the measurement of Sustainability-oriented Entrepreneurial Intentions among Indian Youth. Further, I suggest the authors to capture the respondents' family occupational background. It would be interesting to find out the Sustainability-oriented Entrepreneurial Intentions of respondents from service-class familial backgrounds. The authors can go ahead with this questionnaire for their study."</i>
Expert 3	<i>"India is a country enriched with cultural diversity. Considering the society and environment is relevant if we develop a holistic entrepreneurial ecosystem. As the questions capture all the important aspects of a person's Sustainable Entrepreneurial Intentions, the questionnaire's final components are sufficient. Also, the contributing researchers can circulate the designed questionnaire among people of different ethnic groups (e.g., the Tribal Community of India). Tribal communities are considered deep-rooted with their culture and are closer to nature and the environment."</i>

identify strategies and best practices for promoting SEI and can lead to policy interventions that support these efforts. Using the proposed measurement scale of SEI in different contextual set ups will enable researchers and practitioners to minutely understand the drivers of SEI and draft policies that promote the most significant drivers to boost the Sustainability-oriented Entrepreneurial Behaviour of individuals. Additionally, the key antecedents identified from this research can help design appropriate educational and entrepreneurship training programmes to be conducted by government and non-government organizations. It can enable academic institutions design education and training programmes with focus on strengthening individual level antecedents leading to SEI, thus resulting in wider adoption of sustainable business practices, environmental and social responsibility, and the SDGs. Furthermore, the findings can accelerate awareness about the importance and benefits of SEI among individuals, investors, and society as a whole.

On the global front, benchmarking the SDGs strategies can benefit their attainment by 2030. Therefore, developing nations like India can facilitate the promotion and adoption of the sustainability-oriented entrepreneurial behaviour based on the identified relationships between key antecedents and SEI. In developing nations like India, Government interventions for entrepreneurship promotion are aimed at developing a holistic entrepreneurial ecosystem. A comprehensive understanding of SE and SEI will help achieve this goal. Although India has always been a frontrunner in adopting SDGs, many areas, like restoring traditional art and culture, developing environment-friendly consumer goods, promoting proper infrastructural facilities for education, health, and sanitation etc., are yet to be achieved.

8 Scope of future work

In the future, this study can be taken forward in many ways. Firstly, empirical validation of the proposed scale may be carried out with a survey conducted on diverse populations. Secondly, the literature review section of this research work presents the potential relationships between the identified antecedents of SEI, TPB variables, and SEI. Hypotheses describing these relationships can be empirically tested to better understand the role of these antecedents in shaping an individual's SEI.

Thirdly, the feedback obtained from experts while testing the face validity of the scale has led to the identification of two crucial demographic profile-related variables: the respondent's Family occupation and Ethnicity. Entrepreneurship research has widely explored various aspects of family businesses. Hence, it would be interesting to measure the SEI of youth from such family backgrounds and study the impact of Family Climate on SEI of individuals. The experts have also advised that the proposed scale should be validated with various ethnic groups (e.g. Tribal groups).

9 Limitations

This study aims to identify the key antecedents of SEI and then carry out the preliminary steps of Scale Development, i.e. Dimension Reduction using PCA. Thus, the modelling of the proposed scale is still to be performed. Additionally, the final scale validation is yet to be tested among the population of different contextual set-ups. This scholarly work is based on cross-sectional data collection. It would also be imperative to collect longitudinal data for continuous validation of the proposed SEI scale.

Appendix

See Tables 9 and 10.

Table 9 Anti-image correlation matrix and communalities after dropping the items

Items	Anti-image correlation coefficients	Communalities
q2	0.837 ^a	0.705 ^b
q4	0.791 ^a	0.775 ^b
q5	0.745 ^a	0.847 ^b
q6	0.805 ^a	0.743 ^b
q8	0.560 ^a	0.759 ^b
q9	0.548 ^a	0.826 ^b
q13	0.810 ^a	0.768 ^b
q15	0.691 ^a	0.783 ^b
q21	0.721 ^a	0.622 ^b
q22	0.769 ^a	0.742 ^b
q23	0.844 ^a	0.690 ^b
q24	0.695 ^a	0.655 ^b
q27	0.878 ^a	0.721 ^b
q28	0.866 ^a	0.759 ^b
q29	0.850 ^a	0.809 ^b
q30	0.720 ^a	0.775 ^b
q32	0.718 ^a	0.828 ^b
q33	0.876 ^a	0.693 ^b
q34	0.875 ^a	0.678 ^b
q35	0.887 ^a	0.763 ^b
q36	0.859 ^a	0.737 ^b
q37	0.891 ^a	0.761 ^b
q38	0.837 ^a	0.661 ^b
q41	0.861 ^a	0.799 ^b
q42	0.850 ^a	0.799 ^b
q43	0.882 ^a	0.724 ^b
q44	0.874 ^a	0.778 ^b
q45	0.899 ^a	0.665 ^b
q47	0.812 ^a	0.782 ^b
q48	0.887 ^a	0.703 ^b
q49	0.839 ^a	0.795 ^b
q50	0.864 ^a	0.761 ^b

^aMeasures of sampling adequacy^bExtraction method: principal component analysis

Table 10 Questionnaire with the reduced dimension

Fac_1_ENVIR	(a) A job that provides me the opportunity to save nature (b) A job that entails respect of the environment (c) A job which can make the world a better place to live in (d) A job which provides me the opportunity to directly help poor in the society (e) A job which is more worthwhile to weakest members in the society
Fac_2_GSE	(a) When facing difficult tasks, I am certain that I will accomplish them (b) In general, I think that I can obtain outcomes that are important to me (c) I believe I can succeed at most any endeavour to which I set my mind (d) I will be able to successfully overcome many challenges (e) I am confident that I can perform effectively on many different tasks (f) Compared to other people, I can do most tasks very well
Fac_3_PED	(a) If I find a new opportunity, I would prefer to start my own business (b) In my case, being an entrepreneur is quite satisfying for me (c) Being my boss, it entails greater satisfaction
Fac_4_SEI	(a) My business will concern about environmental impact rather than economic impact (b) If I will set up my own business, it will enhance sustainable development (c) If I will set up my own business, I would prefer societal goods than economic gains
Fac_5_JS	(a) A job that is comparatively more secure ensures future income (b) A job that will be continued in the future for me
Fac_6_EXR	(a) A job that can provide me a good salary (b) A job where promotion and advancement chances are quite certain (c) A job that is prestigious and a status symbol for me (d) A job that offers me a thoughtful total compensation
Fac_7_PEF	(a) How hard do you think it would be to start your own business? (b) If you started your own business, how overworked would you be?
Fac_8_INR	(a) A job where I can work creatively (b) A job where I can be the part of decision-making (c) A job where I can work in my way
Fac_9_ALT	(a) I have done volunteer work for a charity (b) I have helped carry a stranger's belongings
Fac_10_ATS	(a) If you had the required time and resources, to what extent would you consider environmental issues, when evaluating the entrepreneurial opportunity

Data availability The data are available upon request to authors.

Declarations

Conflict of interest The authors state that there is no personal or financial interest of conflict to declare.

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