

Determinants of Sustainability-Oriented Entrepreneurial Intentions of University Students

Olawale Fatoki

<https://orcid.org/0000-0003-1539-8333>

University of Limpopo, South Africa

olawale.fatoki@ul.ac.za

Abstract

Entrepreneurship is no longer about only economic growth but also about social and environmental performance. This has led to the development of sustainable entrepreneurship as a field in entrepreneurship research. The study discussed in this article investigated the determinants of sustainability-oriented entrepreneurial intentions (SOEI) of university students by extending the theory of planned behaviour (TPB). Four personality traits were added to the TPB to develop a predictive model of SOEI. The moderating effect of gender in the relationships between the determinants and SOEI was also examined. The study adopted a quantitative research design. The cross-sectional survey method was used for data collection from final year business management students in three South African universities. Structural equation modelling (PLS SEM) was used for data analysis. The findings indicated significant positive relationships between attitude; perceived behavioural control; internal locus of control; perceived creativity; proactive personality, and SOEI. Overall, 55.9% of the variance in SOEI was explained by the expanded TPB model. The moderating effect of gender was not found to be significant. Theoretically, the study used personality traits to extend the TPB in order to develop a unique model of the antecedents of SOEI. Practically, recommendations to promote the SOEI of university students are suggested. The study contributes towards the understanding of SOEI of university students in South Africa. While the conventional entrepreneurial intention of university students has stimulated many studies, research on SOEI is sparse. Based on the TPB, the study developed and tested a unique multi-dimensional model that incorporates personality traits as antecedents of SOEI.

Keywords: Sustainability-oriented entrepreneurial intentions (SOEI); theory of planned behaviour; personality traits; university students; South Africa



Southern African Business Review
<https://upjournals.co.za/index.php/SABR>
Volume 24 | 2020 | #7795 | 27 pages

<https://doi.org/10.25159/1998-8125/7795>
ISSN 1998-8125 (Online)
© The Author(s) 2020



Published by Unisa Press. This is an Open Access article distributed under the terms of the Creative Commons Attribution-ShareAlike 4.0 International License (<https://creativecommons.org/licenses/by-sa/4.0/>)

Introduction

Entrepreneurship helps to stimulate competition and technological progress, and is one of the major drivers of economic development in developing and developed countries. The traditional outcome of entrepreneurship has focused primarily on economic growth. However, entrepreneurship has also resulted in social challenges (such as poverty and income inequality) and environmental problems (such as pollution and global warming). The measures of the benefits of entrepreneurship should focus not only on economic growth but also on social and environmental performance (Vuorio, Puumalainen, and Fellnhofer 2018; Zahra and Wright 2016). The business sector has a significant role to play in solving social and environmental challenges caused by entrepreneurship. This has led to the development of sustainable entrepreneurship: a business model that focuses on the identification, development and exploitation of opportunities that lead to the creation of an economically, socially and environmentally sustainable society (Majid, Latif, and Koe 2017; Sarango-Lalangui, Santos, and Hormiga 2018). Sustainable entrepreneurship is different from conventional/traditional entrepreneurship that centres primarily on the economic goal of a venture (Smith, Bell, and Watts 2014).

Majid et al. (2017) point out that from a theoretical perspective, sustainable entrepreneurship can be considered as an entrepreneurial effort that involves multiple processes. The first step in the process involves understanding the intention of an individual to become a sustainable entrepreneur. Sustainable entrepreneurship is an intentional process and a planned behaviour (Casrud and Brännback 2011; Vuorio et al. 2018). Sustainability-oriented entrepreneurial intention (SOEI) centres on the intention of an individual to start a business that has economic, social and environmental objectives (Kurkertz and Wagner 2010; Sung and Park 2018). According to Arru (2019), several models have been used by researchers to explain entrepreneurial intention. These models have explored the factors affecting entrepreneurial intention by analysing both individual (micro level) and environmental (macro level) factors. Individual factors include personality traits, cognition of entrepreneurs, and entrepreneurial knowledge and ability. Macro factors include the policy environment, economic environment, cultures and norms, family background and entrepreneurial education (Arru 2019; Hou et al. 2019). Personality-based studies have identified the specific traits of entrepreneurs to include internal locus of control, risk-taking behaviour, creativity, innovation and self-confidence (Vodă and Florea 2019). Personality traits are a part of the psychological approach to entrepreneurship and the two major theories that have emerged from this approach are the entrepreneurial event model (EEM) by Shapero and Sokol (1982) and the theory of planned behaviour (TPB) by Ajzen (1991). Both the TPB and EEM have been used to explain entrepreneurial intention, however, the TPB is the most widely used and dominant theory (Fitzsimmons and Douglas 2011; Uddin and Bose 2012). The TPB is open to modification and can be deepened and broadened by the addition of new variables or changing the path of existing variables (Ajzen 1991).

Despite the recognition of the importance of sustainability-oriented ventures, there is limited empirical evidence about entrepreneurial intentions in the sustainability context (Vuorio et al. 2018). Empirical studies on entrepreneurial intention have largely focused on conventional entrepreneurship (Farrukh et al. 2018; Vodă and Florea 2019). In addition, although the TPB and personality traits have been shown to lead an individual to develop conventional entrepreneurial intentions (Demirtas, Karaca, and Ozdemir 2017; Karabulut 2016), the effects of TPB constructs and personality traits on SOEI remain largely unexplored. Furthermore, the findings of empirical studies about gender differences in conventional entrepreneurial intentions are mixed. While some studies found gender differences, others did not find such differences (Haus et al. 2013; Nicolas and Rubio 2016). The moderating effect of gender in the relationship between TPB constructs and personality traits and SOEI remains largely unexplored. Therefore, the aim of this study is to investigate the determinants of SOEI of university students in South Africa by adopting the TPB. The TPB will be modified by the addition of four personality constructs (internal locus of control, perceived creativity, proactive personality, and risk-taking propensity). Furthermore, the moderating effect of gender in the relationship between the determinants and SOEI will be examined.

The study will be significant in the following ways. First, despite the fact that entrepreneurship is one of the important drivers of job creation and economic growth, previous empirical studies have found that entrepreneurial activity is lowest amongst young people (Hu et al. 2019; Zampetakis et al. 2011). This is especially important in South Africa, with its high levels of general unemployment (30.1%) and youth unemployment (43.2%) (Statistics South Africa 2020). In light of rising unemployment rates, many university students are thinking about starting their own businesses. Therefore, it is important to understand the determinants of entrepreneurial intention of university students.

Second, while the entrepreneurial intention in the field of conventional entrepreneurship has been well researched, empirical studies that focus on SOEI are limited. In addition, the few studies on SOEI (Arru, 2019; Vuorio et al. 2018) have concentrated on developed countries and studies focusing on developing countries, such as South Africa, are scarce. Although sustainable entrepreneurship is perceived as a source of new opportunities in developed countries, its role is equally important in developing countries with considerable economic, social and environmental challenges (Demirel et al. 2019).

Third, SOEI—and by extension the creation of sustainability-oriented ventures—will have social and environmental implications. Sustainable entrepreneurship can help to reduce social problems such as the high rates of unemployment, poverty and income inequality in South Africa. Furthermore, South Africa is the 14th largest emitter of greenhouse gases in the world and the country (as one of the signatories to the Paris Agreement on climate change) has pledged to limit greenhouse gas emissions and meet all the associated challenges caused by climate change (United Nations Framework

Convention on Climate Change 2015). Sustainable entrepreneurship can assist in reducing the environmental challenges facing South Africa in line with the National Development Plan Vision 2030 that aims to transform the country into a green economy.

Literature Review

Sustainable Development, Sustainable Entrepreneurship and Sustainability-Oriented Entrepreneurial Intention

Sustainable development is defined as the “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (Brundtland Report 1987). The goal of sustainable development is inclusive growth that is socially and environmentally sound for today’s population and for future generations. Thus, the major principle of sustainable development is the integration of economic, social and environmental concerns into all facets of decision making (Emas 2015; Muralikrishna and Manickam 2017). Sustainable entrepreneurship, as a field in entrepreneurship research, is derived from sustainable development. Thus, the combination of sustainable development and entrepreneurship has led to the emergence of sustainable entrepreneurship (Sendawula, Turyakira, and Alioni 2018). Groot and Pinkse (2015, 634) define sustainable entrepreneurship as the “discovery, creation, and exploitation of entrepreneurial opportunities that contribute to sustainability by generating social and environmental gains for others in society.” Sustainable entrepreneurship is an intentional process and a planned behaviour. Sustainability-oriented entrepreneurial intention (SOEI) focuses on an individual’s intention to start a business that considers not only profitability but also social and environmental issues (Kurkertz and Wagner 2010; Sung and Park 2018).

Theoretical Background and Development of Hypotheses

Theory of Planned Behaviour

The theory of planned behaviour (TPB) is an extension of the theory of reasoned action (TRA) (Ajzen 1985; Ajzen 1991; Ajzen and Fishbein 1980). The TRA contends that an individual’s intention to perform a behaviour is the main determinant of whether he/she actually performs the behaviour. This is because such behaviours are volitional and under the control of intention. The TRA argues that behavioural intention is influenced by two factors, namely attitude towards performing the behaviour, and subjective norms (Ajzen and Fishbein 1980). The TPB extends the TRA by adding perceived behavioural control as one of the predictors of intention (Ajzen 1991). The TPB stipulates that the performance of a specific behaviour by an individual is determined by the intention, which depends on attitude, subjective norm and perceived behavioural control (Ajzen 1991). The TPB has been used by many empirical studies in predicting behavioural intention in the context of sustainable behaviour (Chen and Tung 2014; Wang et al. 2016) and entrepreneurial intention (Farrukh et al. 2018; Vodā and Florea 2019). Chen and Tung (2014) extended the TPB to predict consumers’ intention to visit green hotels in Taiwan, a developed Asian country. Wang et al. (2016) used the extended TPB to

predict consumers' intention to adopt hybrid electric vehicles in China, a developing Asian country. Farrukh et al. (2018) used personality traits to extend the TPB in the perspective of conventional entrepreneurship in Pakistan, a developing Asian country, while Vodă and Florea (2019) used both the TPB and the EEM to explain entrepreneurial intention of university students in Romania, a developing European country.

- Attitude and SOEI

Attitude towards a behaviour measures the degree to which an individual has a favourable or an unfavourable evaluation of the behaviour being measured (Ajzen 1991). Farrukh et al. (2018) find a significant positive relationship between attitude towards entrepreneurship and the conventional entrepreneurial intention of university students in Pakistan. Data for the study were collected from final year bachelors and masters students in humanities, computer, engineering and business studies. The study by Vodă and Florea (2019) focused on business students in Romania and resulted in similar empirical findings. In the context of SOEI, Majid et al. (2017) find that sustainable attitude positively affects the intention of Malaysian SMEs towards sustainable entrepreneurship. Vuorio et al. (2018), in a study that focused on university students in three academic disciplines (business, architecture and technology) in three countries (Liechtenstein, Austria and Finland), confirm that attitude towards sustainability has a significant positive effect on SOEI of university students. On the basis of theoretical persuasion and prior empirical findings, it is hypothesised that:

Hypothesis 1: There is a significant positive relationship between attitude towards sustainable entrepreneurship and SOEI.

- Subjective Norms and SOEI

Subjective norms measure the likelihood that important individuals or groups will like or dislike the performance of a certain behaviour (Ajzen, 1991). Farrukh et al. (2018) find a significant positive relationship between subjective norms and the conventional entrepreneurial intention of university students. Ham, Jeger, and Ivkovic (2015) point out that the effect of subjective norms on intention formation has been proven to be mostly weak in previous studies (Krueger, Reilly, and Carsrud 2000; Walker, Jeger, and Kopecki 2013). Krueger et al. (2000) examine the effect of TPB constructs on entrepreneurial intention, using a sample of final year university students with exposure to an entrepreneurship course in the United States of America. The findings of the study show an insignificant relationship between subjective norms and entrepreneurial intention. Walker et al. (2013), using the Global Entrepreneurship Monitor dataset, investigate the relationship between country-level entrepreneurial activity and individuals' perceived abilities, subjective norms and intentions to pursue entrepreneurship in Croatia. The study finds an insignificant effect of subjective norms and intention formation. In the context of sustainable entrepreneurship, Majid et al. (2017) find that social norms positively affect the intention of small and medium

enterprises (SMEs) towards sustainable entrepreneurship in Malaysia. Vuorio et al. (2018) report that perceived entrepreneurial feasibility of the EEM, which represents the combination of attitude and subjective norms in the TPB, is positively related to the SOEI of university students. The opinion of an important person or group may influence the intention of an individual to start a sustainability-oriented venture. Consequently, it is hypothesised that:

Hypothesis 2: There is a significant positive relationship between subjective norms and SOEI.

- Perceived Behavioural Control and SOEI

Perceived behavioural control can be described as the perceived difficulty or ease of conducting a behaviour (Ajzen 1991). Perceived behavioural control of the TPB is related to perceived feasibility of the EEM. Farrukh et al. (2018), in a study conducted in Pakistan, find a significant positive relationship between perceived behavioural control and the conventional entrepreneurial intention of university students. In the context of sustainable entrepreneurship, Koe, Omar, and Sa'ari (2015), in a study done in Malaysia, find that perceived feasibility is significantly related to SOEI of SMEs. Vuorio et al. (2018), however, find an insignificant relationship between the two constructs. If an individual perceives that he/she can start and make a success of a sustainability-oriented venture, this can stimulate intention. Consequently, it is hypothesised that:

Hypothesis 3: There is a significant positive relationship between perceived behavioural control and SOEI.

- Personality Traits and Entrepreneurial Intentions

Personality traits depict an individual's characteristic patterns of thoughts, feelings, and behaviours and are of significance in determining behaviour and success (Tran and Von Korfflesch 2016). The personality traits of entrepreneurs that can influence new venture formation include creativity, passion, locus of control, need for achievement, and risk-taking propensity. Other studies have linked the five-factor model (FFM) of personality (openness, conscientiousness, extraversion, agreeableness and neuroticism) to entrepreneurial intention. However, the effects of personality traits on entrepreneurial intentions are inconsistent with some studies finding a positive relationship, while the findings of other studies are insignificant (Brandstätter 2011; Farrukh et al. 2018). In addition, personality traits have been used to extend the TPB in the context of entrepreneurial intentions (Arru 2019; Farrukh et al. 2018).

- Internal Locus of Control and SOEI

Hermawan, Soetjipto, and Rahayu (2016) describe locus of control as a personality variable that describes the expectations about whether an individual will be able to control events in his/her life. The concept was developed by Rotter (1966) and is now a

major aspect of personality studies. Locus of control can be internal or external. People with an internal locus of control (ILOC) believe that they personally control the events in their lives, while individuals with an external locus of control (ELOC) are of the opinion that circumstances beyond their control, such as luck and fate, influence their performance. Thaief and Mudalifah (2015) find a positive relationship between locus of control and the conventional entrepreneurial intention of management students in an Indonesian university. Trivedi, Patel, and Savalia (2015) point out that many researchers have applied the concept of locus of control to study environmentally responsible behaviour. Individuals with ILOC believe that their behaviour can impact on the environment, while those with ELOC believe that they cannot control the environmental situation. Therefore, individuals with ILOC are more concerned about the environment and tend to show a more positive attitude towards ecological action than those with ELOC. Consequently, it is hypothesised that:

Hypothesis 4: There is a significant positive relationship between ILOC and SOEI.

- Perceived Creativity and SOEI

Zhou et al. (2019) describe perceived creativity as the extent to which individuals perceive that they can produce new and useful ideas. Creativity is a significant part of entrepreneurship because entrepreneurs need to generate ideas, identify opportunities and innovate. Creativity is a major factor at the beginning of the entrepreneurial process, since it contributes to the design of new products and services (Hu et al. 2019; Zampetakis et al. 2011). Cheng (2019) notes that creativity enhances the intrinsic motivation of individuals for environmental sustainability, and that both creativity and innovation are at the heart of sustainable development. It is hypothesised that:

Hypothesis 5: There is a significant positive relationship between perceived creativity and SOEI.

- Proactive Personality and SOEI

Proactive personality is defined as a “disposition relating to individual differences in people’s proclivity to take personal initiative in acting to influence their environments in a broad range of activities and situations” (Bateman and Crant 1993, 104). A proactive personality can positively impact on entrepreneurial intention and behaviour through alertness to opportunities. Hu et al. (2019) find a positive relationship between proactive personality and conventional entrepreneurial intention of university students. The study sampled undergraduate students in 19 areas of specialisation at 26 Chinese universities. Pavalache-Ilie and Cazan (2018) indicate that proactive personality is one of the predictors of pro-environmental behaviour because individuals with the proactivity trait are more likely to take proactive steps to protect the environment and act in environmentally sustainable ways. It is hypothesised that:

Hypothesis 6: There is a significant positive relationship between proactive personality and SOEI.

- Risk-taking Propensity and SOEI

Risk-taking propensity is defined as “the perceived probability of receiving the rewards associated with success of a proposed situation, which is required by individuals before they will subject themselves to the consequences associated with failure” (Brockhaus 1980, 510). According to Popescu et al. (2016), risk-taking propensity is an important characteristic of an entrepreneur, because starting a business involves many risks which the entrepreneur must be able to manage. Farrukh et al. (2018) remark that the influence of risk-taking propensity on entrepreneurship is a controversial area of research, and that empirical findings are inconclusive because individuals perceive risk differently in diverse cultural settings. Bogner, Wisemen, and Brengelmann (2000), in a survey of secondary school students in Switzerland, find a positive relationship between students’ environmental perception (measured by preservation, utilisation of nature, and consideration for conservation) and their risk-taking propensity. Hoogendoorn, Zwan, and Thurik (2017) report no significant differences between sustainable and conventional entrepreneurs in terms of their risk attitudes. Risk is an integral part of societal and environmental issues that sustainable entrepreneurs address, as it is uncertain whether sustainable strategies adopted by entrepreneurs will be rewarded by consumers, markets and governments (York and Venkataraman 2010). It is hypothesised that:

Hypothesis 7: There is a significant positive relationship between risk-taking propensity and SOEI.

Moderating Effect of Gender

Robledo et al. (2015) point out that several studies have examined the effect of gender on entrepreneurial intention with different empirical findings. Camelo-Ordaz, Diane-Gonzalez and Ruiz-Navarro (2016), in a study that sampled Spanish entrepreneurs and non-entrepreneurs, found no significant gender difference in entrepreneurial intention. The study concluded that both males and females possess certain common personality traits or can acquire them during the process of venture creation. Verheul et al. (2012) used a representative dataset of more than 8 000 individuals from 29 countries (25 European Union Member States, United States of America, Norway, Iceland and Liechtenstein). The findings of the study show that gender indirectly affects entrepreneurial intention and behaviour through its effect on attitude, subjective norms, and perceived behavioural control, and that women are often driven by different job values and work motivations than men. While women tend to choose entrepreneurship to balance work and family, men tend to pursue wealth creation. In addition, while women prefer work that is intellectually stimulating and can assist them in developing their knowledge and skills, men tend to prefer risk-taking and high incomes.

Ward, Hernandez-Sanchez, and Sanchez-Garcia (2019) investigated the effect of personality traits on the entrepreneurial intention of university students in Spain, a developed country. The results indicate that mean differences between males and

females are not significant and while intentions, perceived behavioural control and subjective norm are higher in males, intrinsic motives for business are higher in females. Malebana (2015), in a survey of final-year commerce students at two South African universities, find that gender significantly affects attitude towards conventional entrepreneurship, perceived behavioural control, subjective norms and entrepreneurial intentions. Koellinger, Minniti, and Schade (2013), using data obtained from the Global Entrepreneurship Monitor in 17 countries (11 European countries; 2 Asian countries; 2 South American countries; United States of America; and Australia), find that women have a lower propensity towards entrepreneurship and this can be explained by their lower level of confidence about their entrepreneurial capabilities, social networks and a higher-level fear of failure. Consequently, it is hypothesised that:

Hypotheses (H8(a-g): gender moderates the relationship between attitude toward sustainable entrepreneurship, subjective norms, perceived behavioural control, internal locus of control, perceived creativity, proactive personality, risk-taking propensity and SOEI.

The conceptual model of the study is depicted in figure 1.

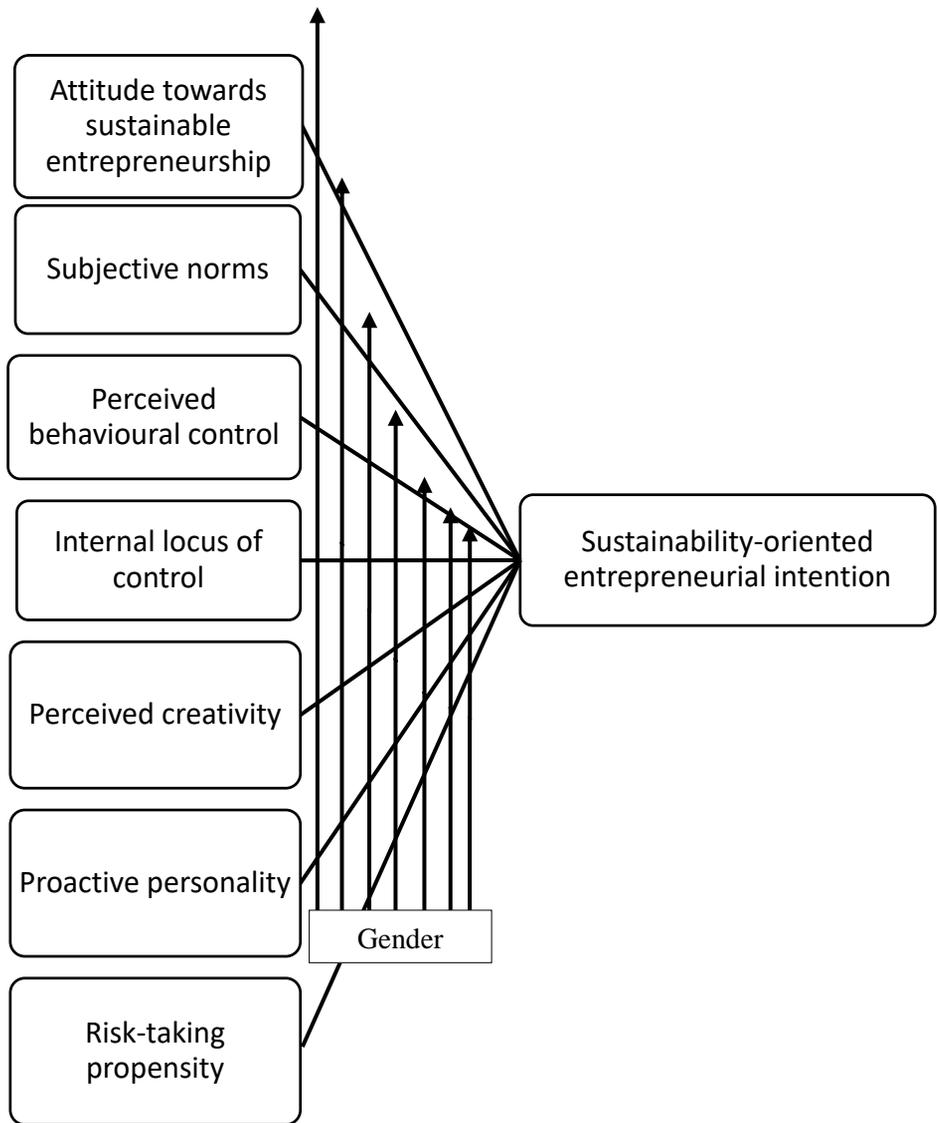


Figure 1: Conceptual model

Research Methodology

This study followed a quantitative research design. The cross-sectional survey approach was used to collect data from the respondents. South Africa has 26 public universities distributed within its nine provinces. The participants in the survey were final year undergraduate students of the Departments of Business Management of three public universities located in the Limpopo, Eastern Cape and Gauteng provinces of South Africa. Business students were chosen as the study unit for the study because their curriculum includes entrepreneurship as a compulsory subject as a part of the curriculum at the final year level. The participants in the survey were conveniently sampled and the self-administered questionnaire method was used to collect data. Two field agents assisted in the data collection process between July and September 2019 and questionnaires were distributed in class with the assistance of lecturers. The questionnaire was validated by two academic experts in the areas of sustainability and entrepreneurship and was also pre-tested with 20 students of one of the participating universities in a pilot study. The students that participated in the pilot study were excluded from the main survey. Adjustments were made to the questionnaire based on the feedback from the reviewers and the pilot study.

The Partial Least Square Structural Equation modelling (The PLS SEM) was used to examine the research model. PLS SEM is a strong and extensively used method to examine latent variables and complex models (Chin 2010). The PLS SEM comprises two sub-models and these are the measurement and structural models. The measurement model is used to examine the relationship between the latent variables and their measures, and the structural model is used to test the relationship between the latent variables (Hair et al. 2019). The questionnaire items are depicted in appendix 1.

Ethical Consideration

Ethical clearance to conduct the research was obtained from the researcher's university. The cover page of the questionnaire contained information about the aim of the study, stated that participation was voluntary and that anonymity would be ensured.

Results

Response Rate and Biographical Details

Four hundred and fifty questionnaires were distributed and 408 questionnaires were returned and found usable. Three questionnaires were not usable because the respondents failed to complete significant questionnaire items. The gender composition of the respondents was 220 females and 189 males. All the respondents were between 20 and 30 years.

Descriptive Analysis

Table 1: Descriptive statistics

Construct	Mean	Standard deviation	Kolmogorov-Smirnov
Attitude towards sustainable entrepreneurship	4.10	1.12	0.175
Subjective norms	2.05	1.03	0.109
Perceived behavioural control	3.40	1.01	0.116
Internal locus of control	3.85	1.16	0.122
Perceived creativity	3.70	1.11	0.147
Proactive personality	3.77	1.21	0.111
Risk-taking propensity	2.85	1.06	0.138
Sustainability-oriented entrepreneurial intention	3.25	1.03	0.120

Table 1 depicts the results of the descriptive statistics. On a five-point Likert scale, a mean value below 3 is considered low; 3 to 4 is moderate; and above 4 is considered high. The results indicated that six constructs have means above 3, which is the average value. This suggests that the respondents in general agreed with the questions. The standard deviations of all the constructs ranged from 1.03 to 1.21, reflecting significant variability in the data set. The Kolmogorov-Smirnov test was used to test the normality of the data. When the value of the Kolmogorov-Smirnov is greater than 0.05, the data are normal. If it is below 0.05, the data significantly deviate from a normal distribution. The results (sig.>0.05) for the constructs assured the normality of the data.

Structural Equation Modelling

This section contains the evaluation of the measurement model and the assessment of the structural model.

The Evaluation of the Measurement Model

The study followed the criteria by Hair et al. (2019) for the evaluation of the measurement model. These include the examination of factor loadings (>0.708), composite reliability (between 0.790 and 0.900), Cronbach's alpha (> 0.700) and the AVE (minimum 0.500). Also, the square roots of the AVEs should be greater than the correlations amongst variables. The results as indicated by table 2 showed that three items were deleted under subjective norms and risk-taking propensity for having loadings below 0.708. The composite reliability values for the constructs ranged between 0.801 and 0.899. In addition, the Cronbach's alphas for all the constructs range between 0.712 and 0.806, indicating a satisfactory internal consistency of measures. This implies an acceptable level of construct validity. The AVEs ranged between 0.573 and 0.679, suggesting a good convergent validity of the scales. The Fornell and Larcker criteria were used to assess discriminant validity. The results as depicted by table 3 showed that the square roots of AVEs depicted on the diagonals are greater than the

corresponding correlation coefficients within the constructs. It can be concluded that the measurement model is satisfactory.

Table 2: The measurement model

Construct	Measurement items	Item loading	Cronbach's alpha	Composite reliability	AVE
Attitudes towards sustainable entrepreneurship (ASE)	ASE1	0.849	0.802	0.899	0.599
	ASE2	0.732			
	ASE3	0.767			
	ASE4	0.742			
	ASE5	0.726			
	ASE6	0.820			
Subjective norms (SN)	SN1	0.808	0.712	0.801	0.573
	SN2 deleted	0.433			
	SN3 deleted	0.472			
	SN4	0.738			
	SN5	0.722			
Perceived behavioural control (PBC)	PBC 1	0.872	0.784	0.859	0.670
	PBC2	0.758			
	PBC3	0.822			
Internal locus of control (ILOC)	ILC1	0.839	0.804	0.899	0.605
	ILC2	0.802			
	ILC3	0.777			
	ILC4	0.728			
	ILC5	0.801			
	ILC6	0.726			
Perceived creativity (PC)	PE1	0.900	0.791	0.863	0.679
	PE2	0.827			
	PE3	0.736			
Proactive personality (PP)	PP1	0.846	0.771	0.899	0.597
	PP2	0.803			
	PP3	0.729			
	PP4	0.725			
	PP5	0.801			
	PP6	0.724			
Risk-taking propensity (RTP)	RTP1	0.816	0.728	0.875	0.583
	TRP2	0.729			
	RTP3	0.736			
	RTP4 deleted	0.477			
	RTP5	0.728			
	RTP6 deleted	0.406			
	RTP7	0.804			
Sustainability-oriented entrepreneurial intention (SOE1)	SOE1	0.841	0.806	0.836	0.631
	SOE12	0.802			
	SOE13	0.737			

Table 3: Discriminant validity

Construct	1	2	3	4	5	6	7	8
SOEI	0.794							
ASE	0.506	0.774						
SN	0.382	0.309	0.757					
PBC	0.401	0.537	0.528	0.819				
ILC	0.615	0.663	0.508	0.621	0.778			
PC	0.665	0.638	0.700	0.609	0.568	0.824		
PP	0.521	0.466	0.527	0.596	0.603	0.625	0.773	
RTP	0.333	0.365	-0.108	0.224	0.353	0.471	0.396	0.764

Note: Diagonals in bold signify the square root of the AVE, while the other figures depict the correlations.

Structural Model Assessment

Following the suggestions by Hair et al. (2019), the structural model assessment included the analysis of the common method bias, the R^2 , the Q^2 and the evaluation of the path coefficients. The likelihood of common method bias (CMB) was examined as the data were self-reported. CMD can be identified through the variance inflation factors (VIFs) that are obtained through a full collinearity test. VIFs that are greater than 3.3 indicate pathological collinearity and are a signal that a model may be contaminated by CMB. However, if the VIFs are equal to or lower than 3.3, the model can be assumed to be free of CMB (Henseler, Ringle, and Sarstedt 2015). The VIFs for the constructs of the study ranged from 1.201 to 2.308, suggesting that that the model is free of CMD. The R^2 shows the proportion of variance in the dependent variable that can be explained by the independent variable. R^2 values are 0.25 (weak), 0.50 (moderate) and 0.75 (substantial) (Kock 2015). The original TPB model accounted for 46.7% of the variance in SOEI. The extended model explained 55.9% of the variance. This indicates that the inclusion of personality factors increased the explained variance by 9.2%. In order to determine if the model adequately explains the empirical data, the goodness of fit test (GOF) was used. The values of the GOF range from 0 to 1 with 0.10 considered small, 0.25 medium, and 0.36 large. The GOF is 0.564, suggesting that the empirical data satisfactorily fit the model and have good predictive power in comparison to baseline values. In addition to the size of the R^2 , a recommended test is the predictive relevance of the model (Q^2). The two prediction techniques for the Q^2 are the cross-validated communality and cross-validated redundancy, with Chin (2010) suggesting the use of the former. A $Q^2 > 0.5$ is considered a predictive model and a Q^2 of 0.59 obtained by this study is indicative of a predictive model. The effect size (f^2) shows the effect of one construct on another construct and values are 0.02 (small), 0.15 (medium), and 0.35 (large). The effect size, f^2 , ranged from 0.026 to 0.164, indicating that the effect sizes of different endogenous constructs on the exogenous constructs ranged from small to medium. The standardised root mean square residual (SRMR) was used to measure the model fit. SRMR has values from 0 to 1 and a well-fitting model usually obtains a value of <0.05 . The study obtained an SRMR value of 0.02, indicating a good model

fit. The results of the path coefficients and T-statistics using the bootstrapping technique are depicted in table 4. In addition, table 5 depicts the results of the moderating effect of gender.

Table 4: Path coefficient and T-statistics

Hypothesised path	Standardised Beta	T-statistics	Decision
H1: ATE→SOEI	0.279	2.774**	Accepted
H2: SN→SOEI	0.066	0.053	Rejected
H3: PBC→SOEI	0.261	4.008*	Accepted
H4: ILOC→SOEI	0.326	2.862**	Accepted
H5: PC→SOEI	0.242	3.020**	Accepted
H6: PP→SOEI	0.229	3.003**	Accepted
H7: RTP→SOEI	0.057	0.079	Rejected

* $p < 0.01$; ** $p < 0.05$

Table 5: Moderating effect of gender

Structural path	Path coefficient original (male) n=189	Path coefficient original (female) =220	Path coefficient (difference female-male)	Decision
ATE→SOEI	0.282	0.269	-0.013	Rejected
SN→SOEI	0.071	0.061	-0.010	Rejected
PBC→SOEI	0.274	0.249	-0.025	Rejected
ILC→SOEI	0.308	0.348	0.040	Rejected
PC→SOEI	0.251	0.233	-0.018	Rejected
PP→SOEI	0.216	0.240	0.024	Rejected
RTP→SOEI	0.061	0.052	-0.009	Rejected

* $p < 0.01$; ** $p < 0.05$;

Tables 4 and 5 depict the results of hypothesis testing. The results ($\beta = 0.279$, $T = 2.774$, $p < 0.05$), ($\beta = 0.264$, $T = 4.008$, $p < 0.01$), ($\beta = 0.264$, $T = 4.008$, $p < 0.05$), ($\beta = 0.126$, $T = 2.862$, $p < 0.05$) and ($\beta = 0.202$, $T = 3.020$, $p < 0.05$) show a significant positive relationship between attitude towards entrepreneurship, perceived behaviour control, internal locus of control, perceived creativity, and proactive personality respectively and SOEI. The results ($\beta = 0.066$, $T = 0.053$, $p > 0.05$) ($\beta = 0.057$, $T = 0.079$, $p > 0.05$) support an insignificant relationship between subjective norms and risk-taking propensity and SOEI. Hypotheses 1, 3, 4, 5 and 6 are accepted, while hypotheses 2 and 7 are rejected. The multi-group analysis (MGA) using the permutation approach was used to determine the moderating effect because the moderating variable is not continuous. Because the moderating variable gender was coded “1” male and “2 female” the dichotomisation technique was used (Hair et al. 2019). Table 5 depicts the summary results of the moderating effect of gender. The results as depicted by table 5 show that the moderating

effects of gender in the relationship between the determinants and SOEI are insignificant. Therefore, the hypothesis (H8(a-h)) is rejected.

Discussion

The study examined the determinants of SOEI of university students by extending the theory of planned behaviour. The findings indicate that attitude towards sustainable entrepreneurship has a significant positive relationship with SOEI. The findings suggest that a more favourable attitude towards sustainable entrepreneurship should lead to a stronger SOEI. Prior empirical studies (Farrukh et al. 2018; Vodă and Florea 2019) find a significant positive relationship between attitude and the conventional entrepreneurial intention of university students. In addition, Majid et al. (2017) and Vuorio et al. (2018) find that that attitude has a significant positive effect on SOEI.

The findings show that the relationship between subjective norms and SOEI is insignificant and this suggests that the influence of important individuals or groups on the SOEI of university students is weak. Majid et al. (2017) find that subjective norms positively affect the intention of SMEs towards sustainable entrepreneurship. However, Ham et al. (2015) remark that the effect of subjective norms on intention formation has been proven to be weak in most empirical studies. Arru (2019) states that many prior studies have concluded that subjective norms do not affect entrepreneurial intentions.

The findings indicate a significant positive relationship between perceived behavioural control and SOEI. The results show that perceived behavioural control is the strongest in the TPB model. The findings are supported by prior studies (Farrukh et al. 2018; Vodă and Florea 2019) that perceived behavioural control is positively related to conventional entrepreneurial intention of university students. Koe et al. (2015) find that the perceived feasibility of the EEM is significantly related to SOEI.

The findings reveal that an internal locus of control has a significant positive relationship with SOEI. This suggests that individuals who believe they can personally control the events and consequences of their lives are attracted to sustainable entrepreneurship. Thaief and Mudalifah (2015) find a positive relationship between locus of control and the conventional entrepreneurial intention of university students. Trvedi et al. (2015) report a positive relationship between internal locus of control and pro-environmental attitude.

The findings show that perceived creativity has a significant positive relationship with SOEI. Creativity is a major factor at the beginning of an entrepreneurial process, especially in the formation of intention, because entrepreneurs need to generate ideas and identify sustainability-oriented opportunities (Hu et al. 2019; Zampetakis et al. 2011). Cheng (2019) remarks that creativity improves the intrinsic motivation of individuals for environmental sustainability, suggesting a link between creativity and SOEI.

The findings indicate that a proactive personality has a significant positive relation with SOEI. Hu et al. (2019) find a positive relationship between proactive personality and entrepreneurial intention. Pavalache-Ilie and Cazan (2018) point out that people with a proactivity trait are more likely to take proactive steps to protect the environment and act in environmentally sustainable ways. This suggests that individuals with proactive personality may be interested in starting sustainability-oriented ventures. The findings indicate that risk-taking propensity has an insignificant relationship with SOEI. Farrukh et al. (2018) find an indirect relationship between risk-taking propensity and the entrepreneurial relationship of university students.

The findings reveal that the moderating effects of gender in the relationship between the determinants and SOEI are insignificant. Ward et al. (2019) find that although intentions, perceived behavioural control and subjective norm are higher in males, the mean differences between males and females are not statistically significant.

Limitations and Strengths

The study has some limitations. Data were collected from only three universities and focused only on business students, and this limits the generalisability of the findings of this study. In addition, the use of convenience sampling may lead to sampling bias. The strength of the study is the development and testing of a unique multi-dimensional model that predicts the SOEI of university students. In addition, although the conventional entrepreneurial intention of university students has stimulated many studies, research on SOEI is sparse. The empirical findings of the study contribute to the literature on the determinants SOEI of university students.

Practical Implications

Practically, the findings of the study are useful to universities and students, government and non-governmental agencies. The findings of the study show that attitude towards sustainable entrepreneurship and perceived behavioural control positively impact on SOEI. In addition, three personality factors (internal locus of control, perceived creativity and proactive personality) positively affect SOEI. In order to improve attitude towards sustainable entrepreneurship, sustainability and entrepreneurship education should be integrated into the curriculum of all the departments in a university. Entrepreneurial education should include the teaching of personality traits and psychological factors that can improve sustainable entrepreneurship. Sustainability-oriented entrepreneurs should be invited to universities to promote active learning. In order to promote perceived behavioural control, students should be encouraged to go for internship and mentorship in identified sustainability-oriented ventures, as this will provide them with practical knowledge. Perceived creativity and proactive personality can be enhanced through the participation of students in sustainability-oriented business plan competitions and incubation and entrepreneurial support initiatives organised by universities. For instance, the South African Breweries (SAB) Foundation business plan competition for university students focuses on the creation of socially sustainable

businesses. Sustainable practices by universities, such as recycling of waste and reuse of water, can improve the general attitude of students toward sustainability. The transformation of universities from institutions focusing not only on teaching and research, but also on sustainable regional and economic development, will help to improve students' attitude towards sustainable entrepreneurship.

Government, through policies and programmes, can encourage the attitude of university students towards sustainable entrepreneurship. The development of sustainable entrepreneurship policy should be included in the National Development Plan Vision 2030. Government agencies that support entrepreneurship, such as the Small Enterprise Development Agency (SEDA), should be visible in promoting sustainable entrepreneurship in universities. Currently, the Department of Higher Education and Training has a programme to transform universities in South Africa into entrepreneurial universities. This programme should be enhanced to become sustainable entrepreneurial universities.

Contribution and Value Add of the Study

The 2030 Agenda for Sustainable Development, adopted by all the member states of the United Nations in 2015, aims to end poverty and inequality, and to spur economic growth while protecting the environment and tackling climate change. In South Africa, one of the objectives of the National Development Plan 2030 is the transition of the country to a low-carbon and resource-efficient economy. Sustainable entrepreneurship, which is a model that focuses on the identification and development of economically, socially and environmentally sustainable businesses, can help to achieve these highlighted goals. The study investigated the determinants of SOEI of university students in South Africa by adopting the TPB. Furthermore, the moderating effects of gender in the relationship between the determinants and SOEI were examined. The study contributes towards the understanding of SOEI of university students in South Africa. While the conventional entrepreneurial intention of university students has stimulated many studies, research on SOEI is sparse. Based on the TPB, the study developed and tested a unique multi-dimensional model that incorporated personality traits as antecedents of SOEI.

Recommendations for Future Studies

The study examined the direct relationship between the TPB and personality factors and SOEI of university students. Future studies can investigate the mediating effects of personality factors in the association between TPB constructs and SOEI. Future studies can also examine the direct or indirect relationship between the five-factor model (FFM) of personality (openness, conscientiousness, extraversion, agreeableness and neuroticism) and SOEI. In addition, the association between the EEM and SOEI can be examined. Including students from other universities and departments and in other countries and cultures will help to improve the generalisability of the findings.

Conclusion

Sustainable entrepreneurship is an intentional process and a planned behaviour. The study investigated the determinants of SOEI among university students in South Africa by adopting the TPB. Four personality-based factors were added as antecedents of SOEI in order to enhance the predictive validity of the TPB. Furthermore, the moderating effects of gender in the relationship between the predictors and SOEI were examined. The findings indicate that TPB constructs and personality traits positively affect the SOEI of university students. Overall, 55.9% of the variance in SOEI was explained by the expanded model. The findings show that the moderating effect of gender is insignificant.

References

- Ajzen, Icek. 1985. "From Intentions to Actions: A Theory of Planned Behaviour." In *Action Control: From Cognition to Behaviour*, 1139, edited by J. Kuhl and J. Beckmann. Heidelberg: Springer. https://doi.org/10.1007/978-3-642-69746-3_2.
- Ajzen, Icek. 1991. "The Theory of Planned Behaviour." *Organizational Behaviour and Human Decision Processes* no. 50, 179–211. [https://doi.org/10.1016/0749-5978\(91\)90020-T](https://doi.org/10.1016/0749-5978(91)90020-T).
- Ajzen, Icek, and Fishbein, Martin. 1980. "Understanding Attitudes and Predicting Social Behaviour." Englewood Cliffs, NJ: Prentice Hall.
- Arru, Brunela. 2019. "An Integrative Model for Understanding the Sustainable Entrepreneurs' Behavioural Intentions: An Empirical Study of the Italian Context." *Environment, Development and Sustainability* no. 22, 3519–76. <https://doi.org/10.1007/s10668-019-00356-x>.
- Bateman, Thomas, and Crant, Micheal. 1993. "The Proactive Component of Organizational Behavior: A Measure and Correlates." *Journal of Organisational Behaviour* no. 14, 103–118. <https://doi.org/10.1002/job.4030140202>.
- Bogner, Franz, Wiseman, Micheal, and Brengelmann, Johann. 2000. "Risk-taking and Environmental Perception." *Environmentalist* 20 (1): 49–62. <https://doi.org/10.1023/A:1006656011403>.
- Brandstätter, Hermann. 2011. "Personality Aspects of Entrepreneurship: A Look at Five Meta-Analyses." *Personality and Individual Differences* 51 (3): 222–230. <https://doi.org/10.1016/j.paid.2010.07.007>.
- Brockhaus, Robert. 1980. "Risk-taking Propensity of Entrepreneurs." *Academy of Management Journal* 23 (3): 509–20. <https://doi.org/10.2307/255515>; <https://doi.org/10.5465/255515>.
- Brundtland Report. 1987. "Our Common Future." Accessed October 17, 2019. <https://www.are.admin.ch/are/en/home/sustainabledevelopment/internationalcooperation/2030agenda/un-milestones-in-sustainable-development/1987--brundtland-report.html>.

- Camelo-Ordaz, Carmen, Dianez- Gonzalez, Juan, and Ruiz-Navarro, Jose. 2016. "The Influence of Gender on Entrepreneurial Intention: The Mediating Role of Perceptual Factors." *Business Research Quarterly* 19 (4): 262–277. <https://doi.org/10.1016/j.brq.2016.03.001>.
- Carsrud, Alan, and Brännback, Malin. 2011. "Entrepreneurial Motivations: What Do we still Need to Know?" *Journal of Small Business Management* 49 (1): 9–26. <https://doi.org/10.1111/j.1540-627X.2010.00312.x>.
- Chen, Mei-Fang, Tung, Pei-Ju. 2014. "Developing an Extended Theory of Planned Behavior Model to Predict Consumers' Intention to Visit Green Hotels." *International Journal of Hospitality Management* no. 36, 221–30. <https://doi.org/10.1016/j.ijhm.2013.09.006>.
- Cheng, Vivian. 2019. "Developing Individual Creativity for Environmental Sustainability: Using an Everyday Theme in Higher Education." *Thinking Skills and Creativity* no. 33, 1–11. <https://doi.org/10.1016/j.tsc.2019.05.001>.
- Chin, Wynne. 2010. *How to Write up and Report PLS Analyses Handbook of Partial Least Squares*. Heidelberg: Springer. https://doi.org/10.1007/978-3-540-32827-8_29.
- Demirel, Pelin, Li, Qian, Rentocchini, Francesco, and Tamvada, Pawan. 2019. "Born to be Green: New Insights into the Economics and Management of Green Entrepreneurship." *Small Business Economics* no. 52, 759–71. <https://doi.org/10.1007/s11187-017-9933-z>.
- Demirtas, Ozgur, Karaca, Mustafa and Ozdemir, Atilla. 2017. "The Influence of Personality Traits on Entrepreneurial Intention." *International Journal of Management and Sustainability* 6 (2): 33–46. <https://doi.org/10.18488/journal.11.2017.62.33.46>.
- Emas, Rachel. 2015. "The Concept of Sustainable Development: Definition and Defining Principles." Accessed October 17, 2019. https://sustainabledevelopment.un.org/content/documents/5839GSDR%202015_SD_concept_definiton_rev.pdf.
- Farrukh, Muhammad, Alzubi, Yazan, Shahzad, Ahmad, Waheed Abdul, and Kanwal, Nagina. 2018. "Entrepreneurial Intentions: The Role of Personality Traits in Perspective of Theory of Planned Behaviour." *Asia Pacific Journal of Innovation and Entrepreneurship* 12 (3): 399–14. <https://doi.org/10.1108/APJIE-01-2018-0004>.
- Fatoki, Olawale. 2018. "Sustainability Orientation and Sustainable Entrepreneurial Intentions of University Students in South Africa." *Entrepreneurship and Sustainability Issues* 2 (2): 990–99. [https://doi.org/10.9770/jesi.2019.7.2\(14\)](https://doi.org/10.9770/jesi.2019.7.2(14)).
- Fitzsimmons, Jason, and Douglas, Evan. 2011. "Interaction between Feasibility and Desirability in the Formation of Entrepreneurial Intentions." *Journal of Business Venturing* 26 (4): 431–440. <https://doi.org/10.1016/j.jbusvent.2010.01.001>.

- Groot, Koen, and Pinkse, Jonatan. 2015. "Sustainable Entrepreneurship and Corporate Political Strategy: Overcoming Market Barriers in the Clean Energy Sector." *Entrepreneurship Theory and Practice* 39 (3): 633–54. <https://doi.org/10.1111/etap.12055>.
- Ham, Marija, Jeger, Marina, and Ivkovic, Anita. 2015. "The Role of Subjective Norms in Forming the Intention to Purchase Green Food." *Ekonomika Istraživanja/Economic Research* 28 (1): 738–748. <https://doi.org/10.1080/1331677X.2015.1083875>.
- Hair, Joseph, Risher, Jeffrey, Sarstedt, Marko, Ringle, Christian, 2019. "When to Use and how to Report the Results of PLS-SEM." *European Business Review* no. 31, 2–24. <https://doi.org/10.1108/EBR-11-2018-0203>.
- Haus Inga, Steinmetz Holger, Isidor Rodrigo, and Kabst Rudiger. 2013. "Gender Effects on Entrepreneurial Intention: A Meta-analytical Structural Equation Model." *International Journal of Gender and Entrepreneurship* 2 (2): 130–56. <https://doi.org/10.1108/17566261311328828>.
- Henseler, Jorg, Ringle, Christian, Sarstedt, Marko, 2015. "A New Criterion for Assessing Discriminant Validity in Variance-based Structural Equation Modelling." *Journal of the Academy of Marketing Science* 43 (1): 115–135. <https://doi.org/10.1007/s11747-014-0403-8>.
- Hermawan, Rio, Soetjipto, Budi, and Rahayu, Wening. 2016. "The Effect of Entrepreneurial Self-Efficacy and Locus of Control on Entrepreneurship Interest through Entrepreneurship Literacy." *IOSR Journal of Business and Management* 18 (2): 141–148.
- Hoogendoorn, Brigitte, Zwan, Peter, and Thurik, Roy. 2017. "Sustainable Entrepreneurship: The Role of Perceived Barriers and Risk." *Journal of Business Ethics* 157 (3): 1133–54. <https://doi.org/10.1007/s10551-017-3646-8>.
- Hou, Fei, Su, Yu, Lu, Minru, and Qi, Mingde, 2019. "Model of the Entrepreneurial Intention of University Students in the Pearl River Delta of China." *Frontiers in Psychology* no. 10, 1–16. <https://doi.org/10.3389/fpsyg.2019.00916>.
- Hu, Riu, Wang, Li, Zhang, Wei, and Bin, Peng. 2019. "Creativity, Proactive Personality, and Entrepreneurial Intention: The Role of Entrepreneurial Alertness." *Frontiers in Psychology* no. 9, 1–10. <https://doi.org/10.3389/fpsyg.2018.00951>.
- Karabulut, Tugba. 2016. "Personality Traits on Entrepreneurial Intention." *Procedia-Social and Behavioural Sciences* no. 229, 12–21. <https://doi.org/10.1016/j.sbspro.2016.07.109>.
- Koe, Wei-Loon, Omar, Roaimah, Sa'ari, Juan. 2015. "Factors Influencing Propensity to Sustainable Entrepreneurship of SMEs in Malaysia." *Procedia-Social and Behavioural Sciences* no. 172, 570–577. <https://doi.org/10.1016/j.sbspro.2015.01.404>.
- Koellinger, Philip, Minniti, Maria, and Schade, Christain. 2013. "Gender Differences in Entrepreneurial Propensity." *Oxford Bulletin of Economics. Statistics* 75 (2): 213–234. <https://doi.org/10.1111/j.1468-0084.2011.00689.x>.

- Krueger, Norris, Reilly, Micheal and Carsrud, Alan. 2000 “Competing Models of Entrepreneurial Intentions.” *Journal of Business Venturing* 15 (5–6): 411–32. [https://doi.org/10.1016/S0883-9026\(98\)00033-0](https://doi.org/10.1016/S0883-9026(98)00033-0).
- Kock, Ned. 2015. “A Note on how to Conduct a Factor-based PLS-SEM Analysis.” *International Journal of e-Collaboration* 11 (3): 1–9. <https://doi.org/10.4018/ijec.2015100101>; <https://doi.org/10.4018/ijec.2015040101>; <https://doi.org/10.4018/ijec.2015010101>; <https://doi.org/10.4018/ijec.2015070101>.
- Kuckertz, Andreas, and Wagner, Marcus. 2010. “The Influence of Sustainability Orientation on Entrepreneurial Intentions: Investigating the Role of Business Experience.” *Journal of Business Venturing* 25 (5): 524–39. <https://doi.org/10.1016/j.jbusvent.2009.09.001>.
- Majid, Abdul, Latif, Aziz, and Koe, Wei-Loon. 2017. “SMEs’ Intention towards Sustainable Entrepreneurship.” *European Journal of Multidisciplinary Studies* 2 (3): 24–32. <https://doi.org/10.26417/ejms.v4i3.p24-32>.
- Malebana, Mmakgabo. 2015. “Gender Differences in Entrepreneurial Intention in the Rural Provinces of South Africa.” *Journal of Contemporary Management* no. 12, 615–637.
- Muralikrishna, Iyyanki, and Manickam, Valli. 2017. *Environmental Management: Science and Engineering for Industry*. Elsevier.
- Nicolas, Catalina, and Rubio, Alicia. 2016. “Social Enterprise: Gender Gap and Economic Development.” *European Journal of Management and Business Economics* no. 25, 56–62. <https://doi.org/10.1016/j.redeen.2015.11.001>.
- Pavalache-Ilie, Mariela, and Cazan, Ana-Maria. 2018. “Personality Correlates of Pro-environmental Attitudes.” *Journal of Environmental and Health Research* 28 (1): 71–8. <https://doi.org/10.1080/09603123.2018.1429576>.
- Popescu, Cristain, Bostan, Ionel, Robu, Ioan-Bogdan, Maxim, Andrei, and Maxim, Laura. 2016. “An Analysis of the Determinants of Entrepreneurial Intentions among Students: A Romanian Case Study.” *Sustainability* 8 (8): 771–93. <https://doi.org/10.3390/su8080771>.
- Robledo, Jose, Aran, Maria, Martin-Sanchez, Victor, and Molina, Miguel. 2015. “The Moderating Role of Gender on Entrepreneurial Intentions: A TPB Perspective.” *Intangible Capital* 11 (1): 92–117. <https://doi.org/10.3926/ic.557>.
- Rotter, Julian 1966. “Generalized Expectancies for Internal versus External Control of Reinforcement Psychological Monographs.” *General and Applied* no. 80, 1–28. <https://doi.org/10.1037/h0092976>.
- Sarango-Lalangui, Paul, Santos, Jane, and Hormiga, Esther. 2018. “The Development of Sustainable Entrepreneurship Research Field.” *Sustainability* 10 (6):1–19. <https://doi.org/10.3390/su10062005>.

- Sendawula, Kasimu, Turyakira, Peter, and Alioni, Christopher. 2018. "Sustainable Entrepreneurship Intention among University Students in Uganda: A Conceptual Paper." *African Journal of Business Management* 12 (6): 131–139. <https://doi.org/10.5897/AJBM2017.8447>.
- Shapero, Albert, and Sokol, Lisa 1982. "The Social Dimensions of Entrepreneurship." In *The Encyclopedia of Entrepreneurship*, 72–90, edited by C. Kent, D. Sexton, and K. Vesper. Englewood Cliffs, NJ: Prentice Hall.
- Smith, Rachael, Bell, Robin, and Watts, Helen, 2014. "Personality Trait Differences between Traditional and Social Entrepreneurs." *Social Enterprise Journal* 10 (3): 200–21. <https://doi.org/10.1108/SEJ-08-2013-0033>.
- Statistics South Africa. 2020. "Quarterly Labour Force Survey." Accessed July 1, 2020. <http://www.statssa.gov.za/?p=12695>.
- Sung, Chang, and Park, Joo. 2018. "Sustainability Orientation and Entrepreneurship Orientation: Is there a Trade-off Relationship between them?" *Sustainability* 10 (2): 1–14. <https://doi.org/10.3390/su10020379>.
- Thaief, Ilham, and Mudalifah. 2015. "Effect of Locus of Control and Need for Achievement Results of Learning through Entrepreneurial Intentions: Case Study on Student Courses Management, Faculty of Economics University of Makasar." *International Business Management* 9 (5): 798–804.
- Tran, Anh, and Von Korfflesch, Harald. 2016. "A Conceptual Model of Social Entrepreneurial Intention Based on the Social Cognitive Career Theory." *Asia Pacific Journal of Innovation and Entrepreneurship* 10 (1): 17–38. <https://doi.org/10.1108/APJIE-12-2016-007>.
- Trivedi, Rohit, Patel, Jayesh, Savalia, Jignasa. 2015. "Pro-environmental Behaviour, Locus of Control and Willingness to Pay for Environmental Friendly Products." *Marketing Intelligence and Planning* 33 (1): 67–89. <https://doi.org/10.1108/MIP-03-2012-0028>.
- Uddin, Raez, and Bose, Tarun. 2012. "Determinants of Entrepreneurial Intention of Business Students in Bangladesh." *International Journal of Business and Management* 7 (24): 128–37. <https://doi.org/10.5539/ijbm.v7n24p128>.
- United Nations Framework Convention on Climate Change. 2015. "Adoption of the Paris Agreement." 21st Conference of the Parties, Paris: United Nations.
- Verheul, Ingrid, Thurik, Roy, Grilo, Isabel, and Van der Zwan, Peter. 2012. "Explaining Preferences and Actual Involvement in Self-employment: Gender and the Entrepreneurial Personality." *Journal of Economic Psychology* 33 (2): 325–41. <https://doi.org/10.1016/j.joep.2011.02.009>.
- Vodă, Ana, and Florea, Nelu. 2019. "Impact of Personality Traits and Entrepreneurship Education on Entrepreneurial Intentions of Business and Engineering Students." *Sustainability* 11 (4): 1192–1202. <https://doi.org/10.3390/su11041192>.

- Vuorio, Anna, Puumalainen, Kaisu, and Fellnhofer, Katharina. 2018. "Drivers of Entrepreneurial Intentions in Sustainable Entrepreneurship." *International Journal of Entrepreneurial Behaviour and Research* 24 (2): 359–81. <https://doi.org/10.1108/IJEBR-03-2016-0097>.
- Walker, Kevin, Jeger, Marina, and Kopecki, Dragan. 2013. "The Role of Perceived Abilities, Subjective Norm and Intentions in Entrepreneurial Activity." *The Journal of Entrepreneurship* 22 (2): 181–202. <https://doi.org/10.1177/0971355713490621>.
- Wang, Shanyong, Fan, Jin, Zhao, Dintao, Yang, Shu, and Fu, Yuanguang. 2016. "Predicting Consumers' Intention to Adopt Hybrid Electric Vehicles: Using an Extended Version of the Theory of Planned Behaviour Model." *Transportation* 43 (1): 1–21. <https://doi.org/10.1007/s11116-014-9567-9>.
- Ward, Alexander, Hernandez-Sanchez, Brizeida, and Sanchez-Garcia, Jose. 2019. "Entrepreneurial Potential and Gender Effects: The Role of Personality Traits in University Students' Entrepreneurial Intentions." *Frontiers in Psychology* no. 10, 1–18. <https://doi.org/10.3389/fpsyg.2019.02700>.
- York, Jeffrey, and Venkataraman, S. 2010. "The Entrepreneur-environment Nexus: Uncertainty, Innovation, and Allocation." *Journal of Business Venturing* 25 (5): 449–463. <https://doi.org/10.1016/j.jbusvent.2009.07.007>.
- Zahra, Shaker, Wright, Mike. 2016. "Understanding the Social Role of Entrepreneurship." *Journal of Management Studies* 53 (4): 610–29. <https://doi.org/10.1111/joms.12149>.
- Zampetakis, Leonidas, Gotsi, Manto, Andriopoulos, Constantine, and Moustakis; Vassillis. 2011. "Creativity and Entrepreneurial Intention in Young People: Empirical Insights from Business School Students." *International Journal of Entrepreneurship and Innovation Management* no. 12, 189–99. <https://doi.org/10.5367/ijei.2011.0037>.
- Zhou, Jing, Wang, May, Bavato, Davide, Tasselli, Stefana, and Wu, Junfeng. 2019. "Understanding the Receiving Side of Creativity: A Multidisciplinary Review and Implications for Management Research." *Journal of Management* 45 (6): 2570–2595. <https://doi.org/10.1177/0149206319827088>.

Appendix 1: Questionnaire

Construct	Items	Question type	Adapted from
Attitude toward sustainable entrepreneurship	If I would set up a firm, it probably would: Enhance sustainable development. Reduce environmental problems Reduce world poverty. Impact positively on society's weakest members. Maximise societal goods and not just economic profit. Use natural resources positively.	Five-point Likert Scale with "1" strongly disagree and "5" strongly agree	Vuorio, Puumalainen and Fellnhofer (2018), Arru (2019).
Subjective norms	My class mates think that I should start a sustainability-oriented business Most people that are close to me think that I should start a sustainability-oriented business My family thinks that I should start a sustainability-oriented business. News media publicity about sustainability will prompt me to start a sustainability-oriented business. If other people around me start a sustainability-oriented business, this will prompt me to start my own sustainability-oriented business.	Five-point Likert Scale with "1" strongly disagree and "5" strongly agree	Chen and Tung (2014), Vuorio, Puumalainen and Fellnhofer (2018)
Perceived behavioural control	I am sure that I can start my own sustainability-oriented business. I am sure of success if I started my own sustainability-oriented business. it will be easy for me to start my own sustainability-oriented business.	Five-point Likert Scale with "1" strongly disagree and "5" strongly agree	Chen and Tung (2014), Vuorio, Puumalainen and Fellnhofer (2018)
Internal locus of control	Whether or not I am successful in life depends mostly on my ability. I feel in control of my life	Five-point Likert Scale with "1" strongly disagree and "5" strongly	Hermawan, Soetjipto and Rahayu (2016) Vodă and Florea (2019)

Construct	Items	Question type	Adapted from
	<p>When I get what I want, it is usually because I worked hard for it.</p> <p>My life is determined by my own actions.</p> <p>When I make plans, I am almost certain that I can work them out.</p> <p>The success of my life depends heavily on my ability.</p>	agree	
Perceived Creativity	<p>I think I am a very creative person.</p> <p>I like to try novel things despite the risk of failing.</p> <p>I can easily think of a lot of different and useful ideas.</p>	Five-point Likert Scale with “1” strongly disagree and “5” strongly agree	Zampetakis et al. (2011), Hu et al. (2019)
Proactive personality	<p>I am constantly looking for different ways to improve my life.</p> <p>I am a powerful force of constructive changes.</p> <p>If I see something that I feel not comfortable, I would take action immediately.</p> <p>Despite the challenges that I face, if I believe in something, I would make it happen.</p> <p>I am always looking for better ways to do things.</p> <p>6. If I believe in an idea, I would realise it despite facing obstacles.</p>	Five-point Likert Scale with “1” strongly disagree and “5” strongly agree	Hu et al. (2019)
Risk-taking propensity	<p>I am ready to take risks.</p> <p>I am willing to take actions that result in unexpected outcomes.</p> <p>I enjoy taking daring actions by doing precarious activities.</p> <p>I treasure chances.</p> <p>I am cautious about unpredictable situations.</p> <p>I accept whatever situations involving personal risk that yield great rewards.</p> <p>7. I take chances regardless</p>	Five-point Likert Scale with “1” strongly disagree and “5” strongly agree	Farrukh et al. (2018), Popescu et al. (2016).

Construct	Items	Question type	Adapted from
	of the risks.		
Sustainability-oriented entrepreneurial intentions	I am willing to become a sustainability-oriented entrepreneur. I plan to be a sustainability-oriented entrepreneur. I intend to be a sustainability-oriented entrepreneur.	Five-point Likert Scale with “1” strongly disagree and “5” strongly agree	Vuorio, Puumalainen and Fellnhofer (2018), Fatoki (2018).