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The impact of values, identity and personal norms on the green entrepreneurial intention of university students in South Africa

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ABSTRACT

One of the major challenges that the world currently faces is climate change. Green entrepreneurship offers a viable way for a country to manage climate change and improve economic growth. University students are tomorrow's entrepreneurs, and it is important to understand the determinants of their green entrepreneurial intention. The objective of this study is to investigate the effects of biospheric values, environmental self-identity, and personal norms on the green entrepreneurial intention of university students through an extended Theory of Planned Behavior. The study adopts the quantitative research method and data is collected from students at two South African universities. The cross-sectional survey method is adopted for data collection and purposive sampling is used to select the study participants. Structural equation modeling is used to test the hypotheses of the study using SPSS AMOS 27. The findings indicate that biospheric values, attitude, perceived behavioral control, environmental self-identity and personal norms are significantly positively related to green entrepreneurial intention. The study concludes that an extended Theory of Planned Behavior model that includes biospheric values, environmental self-identity identity and personal norms is useful in predicting the green entrepreneurial intention of university students. Entrepreneurship education and improved awareness of ecological challenges are needed to improve the green entrepreneurial intention of university students.

Contribution/Originality: The study's original contribution is in the testing of a new theoretical model that links biospheric values, environmental self-identity and personal norms to the green entrepreneurial intention of university students.

1. INTRODUCTION

One of the major challenges that the planet currently faces is climate change and the inability to transit to a 1.5°C world (Butler, 2018). Climate change is rapid, and the emission of greenhouse gases has continued to grow persistently, leading to global warming (Santos, Ferreira, & Pedersen, 2022). South Africa is one of the world's largest emitters of carbon dioxide and the country can significantly reduce the emission of greenhouse gases by transiting into a low-carbon economy (Oladunni, Mpofu, & Olanrewaju, 2021). This will enable South Africa to build an inclusive and sustainable economy that responds positively to climate change (Ngepah, Tchuinkam Djemo, & Saba, 2022). One of the ways to limit the effects of climate change is for countries to transit into a green economy described as a socially inclusive and low-carbon economy (Georgeson, Maslin, & Poessinouw, 2017; Zhang, Xu,

Chen, Li, & Chen, 2022). Private and public sector investments drive economic activities and assets that reduce carbon emissions and enable resource efficiency (Söderholm, 2020; Zhang et al., 2022).

Green entrepreneurship offers a viable way for a country to transform into a green economy, reduce unemployment among graduates and improve economic growth (Amankwah & Sesen, 2021). Green entrepreneurs boost demand for green products and services, introduce environmentally friendly production techniques and create green jobs (Navarathinam & Amutha, 2022). Entrepreneurship often starts as a planned behavior and entrepreneurial ideas are often reached through entrepreneurial intention (Anjum, Amoozegar, Farukk, & Heidler, 2022). Green entrepreneurial intention (GEI) is the state of mind preceding actions toward green entrepreneurial behavior (Polas et al., 2020). However, the level of green entrepreneurship is low in South Africa because of factors such as the lack of green skills and financial and market barriers (Mukonza, 2020). Despite these challenges, some entrepreneurs in South Africa have started to respond to climate change due to increasing consumer preference for green products across different economic sectors (Trade and Industrial Policy Strategies, 2022). Many small businesses are reducing their carbon emissions by becoming more energy efficient, adopting renewable energy and lowering water consumption (Trade and Industrial Policy Strategies, 2022).

Institutions of higher learning have a major role to play in a country's sustainable development and transition into a green economy (Lim, Haufiku, Tan, Ahmed, & Ng, 2022). The role of universities as institutions of higher learning includes the provision of innovations that help to solve global challenges such as global warming and climate change (Hill & Ward, 2022). In addition, universities as sources of new information based on research and advanced learning are significant partners in the creation of a knowledge-based economy (Ahmad, Batool, Iqbal, & Shah, 2021). University students are tomorrow's entrepreneurs, and efforts to enhance their green entrepreneurship will lead to a country's sustainable development (Cai, Huang, & Lee, 2022). Therefore, it is important to understand the determinants of the GEI of university students.

The Theory of Planned Behavior (TPB) is one of the most widely used theories in studies on intention and behavior (Yadav & Pathak, 2016). However, the TPB primarily takes into consideration normative influences and fails to consider factors such as values, self-identity and personal norms that can also affect behavioral intention (Nguyen, Lobo, & Greenland, 2016). According to Ajibade and Boateng (2021) no single theory can adequately account for the complex relationship between the environment and human behavior. Understanding green behavior based solely on the TPB may not be sufficient because pro-environmental behavior is a combination of both self-interest and pro-social motives (Ates, 2020). The TPB is a flexible model, and other variables can be added to improve its explained variance (Zhang, Fan, Zhang, & Zhang, 2019). The combination of the TPB and environmental self-identity and personal norms helps to introduce both rational and moral considerations to pro-environmental behavior (Setiawan, Afiff, & Heruwasto, 2020). The inclusion of other constructs may improve the explanatory power of the TPB in understanding pro-environmental intention and behavior (Ates, 2020). The aim of the study is to examine the applicability of the extended TPB that includes biospheric values, environmental self-identity and personal norms in explaining the GEI of university students.

This study is significant in the following ways: First, to the best of the author's knowledge, studies that have extended the TPB with biospheric values, personal norms and environmental self-identity in the context of the GEI of university students are scarce. Thus, the study develops and tests a new theoretical model of the determinants of the GEI of university students. Previous studies on GEI, such as Qazi, Qureshi, Raza, Khan, and Qureshi (2020) and Prabowo, Ikhsan, and Yuniarty (2022) focused on the effects of personality traits, cultural values, cognition, and contextual factors. In addition, pro-environmental intention and behavior can be influenced by many factors. Therefore, an integrated model addresses the shortcomings of using a single theory to explain GEI (Ates, 2020). The study also focuses on university students who can be classified as future entrepreneurs. The students of today will have a major impact on the future state of the environment through their actions and behavior (Cai et al., 2022). Furthermore, understanding the antecedents of GEI will help to achieve a green economy in South Africa. This will

help to achieve the goal of environmental sustainability in South Africa as envisioned by the National Development Plan, 2030 (South African Government, 2012) and Sustainable Development Goals 8 and 12 (United Nations, 2015). The study is organized as follows: Section two contains the literature review; the research methodology, results, discussion, and conclusion are described in Sections three, four, five and six, respectively.

2. LITERATURE REVIEW

2.1. GEI

Green entrepreneurship encompasses the creation and implementation of business solutions to reduce environmental challenges and drive positive social change (Polas et al., 2020). Green entrepreneurship focuses on the development of start-ups using green processes and green products and services. Green entrepreneurship leads to the creation of businesses that use resources efficiently, reduce pollution and waste, and prevent or reduce environmental damage (Bergset & Fichter, 2015). Green entrepreneurship is an intentional, planned behavior, and involves a complex process of various stages (Yi, 2021). GEI can be described as the state of mind preceding actions that direct attention toward green entrepreneurship (Polas et al., 2020).

2.2. Biospheric values

Values are "a desirable trans-situational goal varying in importance, which serves as a guiding principle in the life of a person or other social entity" (Schwartz, 1994). Stern, Dietz, Abel, Guagnano, and Kalof (1999) obtained three value components, namely biospheric values, altruistic values and egoistic values, from Schwartz's theory of basic values (Schwartz, 1994). These three values can be clearly differentiated empirically (De Groot & Steg, 2010). Biospheric values can be described as a value orientation in which individuals judge their actions based on the benefits and costs to the ecosystem or the biosphere (Stern et al., 1999). Altruistic values focus on concern for the welfare of other people or society (Stern et al., 1999). Egoistic values describe the maximization of individual outcomes (Stern et al., 1999). Out of the three value orientations, biospheric values have proven to be a consistent and important predictor of green behavior (Bouman, Steg, & Zawadzki, 2020; Ruepert et al., 2016) and have been individually linked to pro-environmental intention (Nguyen et al., 2016; Wang et al., 2021).

An individual with a high biospheric value orientation is likely to be more interested in actions that will lead to environmental protection (Van Der Werff, Steg, & Keizer, 2013). Therefore, biospheric values and attitude toward pro-environmental behavior are positively associated (Ates, 2020). The findings of the study by Tiwari (2022) indicate that biospheric values positively affect the attitude of millennials toward green purchases. Nguyen et al. (2016) pointed out that the effect of biospheric values on subjective norms have received sparse empirical attention despite its importance in determining pro-environmental behavior. Individuals may develop perceived social norms in the context of environmentally friendly behavior because they are concerned about nature. Thus, biospheric values may motivate the social norms of consumers (Nguyen et al., 2016). According to Soyez (2012), an ecocentric value orientation positively influences subjective norms in the context of the purchase of organic food. Biospheric values can also affect perceived behavioral control with respect to pro-environmental behavior (Nguyen et al., 2016). The study by Nguyen et al. (2016) also found that biospheric values have a negative effect on perceived inconvenience in the context of green behavior. Wang et al. (2021) remarked that individuals with a biospheric value orientation tend to see themselves as environmentally friendly. The findings of the study by Van Der Werff et al. (2013) indicate that biospheric values positively affect environmental self-identity. In addition, Nguyen et al. (2016) found that the relationship between biospheric values and environmental self-identity is significantly positive. Kim and Seock (2019) studied the purchase behavior of ecologically friendly apparels and found a significant positive relationship between bio-altruistic values (a combination of biospheric and altruistic values) and personal norms. Biospheric values can also affect pro-environmental intention. Biospheric values are a strong

predictor of green attitude, intention and behavior (Wang et al., 2021). The study by Perera, Kalantari Daronkola, and Johnson (2022) however, found that biospheric values do not significantly affect green purchase intention.

The literature is sparse on how biospheric values affect attitude, subjective norms, and perceived behavior control in the context of green entrepreneurship. However, university students with biospheric values should develop a positive attitude toward green entrepreneurship as this can help to preserve and protect the natural environment. In addition, biospheric values may motivate the social norms of students to engage in green entrepreneurship. Furthermore, students with biospheric values may engage in green entrepreneurship if they perceive that they have the ability to do so. Students with biospheric values may see themselves as ecologically friendly and develop environmental self-identity and personal norms. Consequently, the following hypotheses are developed:

H1: Biospheric values are positively associated with attitude toward green entrepreneurship.

H2: Biospheric values are positively associated with subjective norms.

H3: Biospheric values are positively associated with perceived behavioral control.

H4: Biospheric values are positively associated with environmental self-identity.

H5: Biospheric values are positively associated with personal norms.

H6: Biospheric values are positively associated with GEI.

2.3. Theory of Planned Behavior (TPB) variables and Green Entrepreneurial Intention (GEI)

The literature is inconclusive regarding the effects of attitude, subjective norms and perceived behavioral control on GEI. Prabowo et al. (2022) used the TPB to explore the GEI of university students in Indonesia, and the findings showed that attitude toward green entrepreneurship and subjective norms do not have significant relationships with GEI. However, the effect of perceived behavioral control is significant. Bouarar, Mouloudj, Makhlouf, and Mouloudj (2022) examined the determinants of the intention to create green start-ups by university students in Algeria. The findings indicate that attitude, subjective norms and perceived behavioral control positively affect the intention to create green start-ups. Yasir, Mahmood, Mahmood, Rashid, and Liren (2021) used the TPB to investigate the antecedents of GEI of university students in Pakistan and found that attitude, social norms and perceived behavioral control positively impacted their sustainable entrepreneurial intention. Ranasinghe and Ajward (2019) studied the determinants of GEI in small businesses in Sri-Lanka and found that the effects of attitude and perceived behavioral control are significant but the impact of subjective norms was found to be insignificant. Guided by the TPB, the following hypotheses are developed:

H7: Attitude toward green entrepreneurship is positively related to GEI.

H8: Subjective norms are positively related to GEI.

H9: Perceived behavioral control is positively related to GEI.

2.4. Environmental self-identity and GEI

Self-identity can be described as the self-definition of an individual based on roles, positions, or engagement in a particular behavior (Biddle, Bank, & Slavings, 1987). Environmental self-identity is related to self-identity and describes the extent to which a person regards their behavior as friendly to the environment (Van Der Werff et al., 2013). The findings of empirical studies by Carfora, Caso, Sparks, and Conner (2017) and Qasim, Yan, Guo, Saeed, and Ashraf (2019) indicate that environmental self-identity has a significant positive relationship with the intention to engage in different pro-environmental behaviors. Therefore, university students who consider themselves environmentally friendly are likely to develop green entrepreneurial intention. It is hypothesized that:

H10: Environmental self-identity and GEI are positively related.

2.5. Personal Norms and GEI

Personal norms can be described as the feelings of moral obligation to engage in a particular behavior (Sarmento & Loureiro, 2021). There is a significant positive relationship between personal norms and pro-environmental intention (Sarmento & Loureiro, 2021). The findings of the study by Onel (2017) indicate that personal norms positively affect the intention to purchase environmentally friendly products. D'Arco, Marino, and Resciniti (2023) found that personal norms positively impact the intention of Generation Z consumers to engage in tourism. It is hypothesized that:

H11: Personal norms and GEI are positively related.

Figure 1 depicts the study's conceptual model.

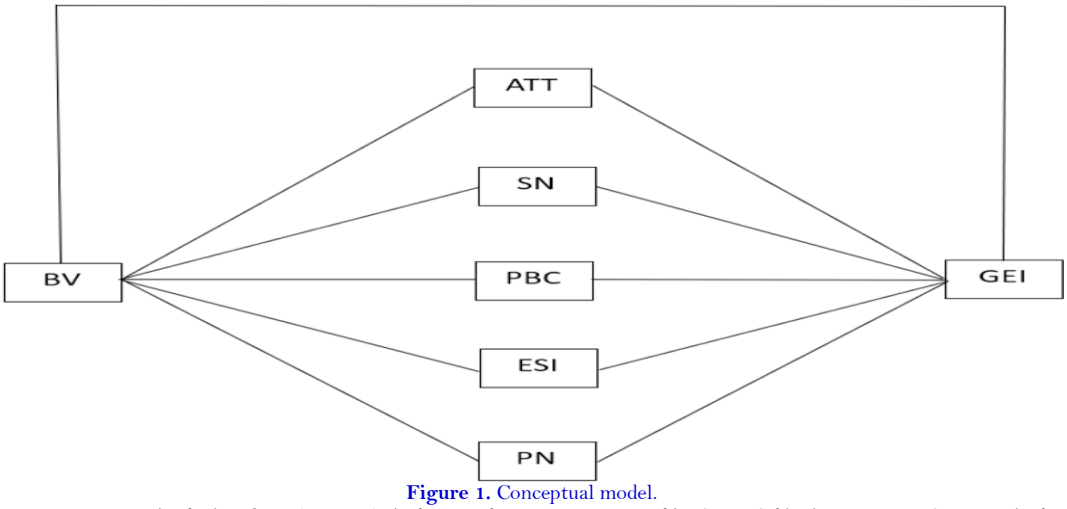

Figure 1. Conceptual model.

Note: BV = Biospheric values; ATT = Attitude toward green entrepreneurship; SN = Subjective norms; PBC = Perceived behavioral control; ESI = Environmental self-identity; PN = Personal norms; GEI = Green entrepreneurial intention.

3. RESEARCH METHODOLOGY

The study was guided by a positivist research philosophy and a deductive approach. A quantitative research design was used, and the study was conducted at two South African universities. The first university is in the province of Limpopo and the second university is in the province of Gauteng. The statistical population of the study comprises all undergraduate and postgraduate (honors) business students. A cross-sectional survey method was used for data collection and the purposive sampling method was used to identify the study participants. A minimum sample of 200 is needed for structural equation modeling (SEM) using AMOS, as suggested by Kline (2005). A pilot study that involved 20 students was carried out to validate the questionnaire, which consisted of introductory information and questions on biospheric values, TPB constructs, environmental self-identity, and personal norms. The scales used to measure the constructs were adapted from previous studies and are detailed in Appendix 1. Ethical clearance was obtained from the researcher's university before data collection. Data collection took place between May and November 2022 at the two universities. IBM SPSS AMOS 27 was used for data analysis.

4. RESULTS

4.1. Response Rate and Biographical Details

Data collection involved the distribution of 402 questionnaires to the participants; 262 returned questionnaires were found to be usable. Some questionnaires could not be used because the respondents did not complete some sections, thereby leaving out vital information. The demographics of the respondents are as follows: 142 females and 120 males; 195 undergraduates and 67 postgraduates; 216 were aged 18–25 years, and 46 were over 25.

4.2. Common Method Variance (CMV)

The study obtained data from a single source using a cross-sectional survey and the CMV was assessed. To minimize the CMV, the questionnaire did not contain sensitive personal details to ensure the anonymity of respondents and reduce responses that are socially desirable (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). Furthermore, the Harman single factor test showed eight factors with Eigen values greater than one, accounting for 79% of the total variance. This indicates that the CMV is not a problem (Harman, 1976; Podsakoff et al., 2003).

4.3. Structural Equation Modeling

4.3.1. Measurement Model

Confirmatory factor analysis (CFA) was used to test the measurement model via AMOS, and issues related to convergent and discriminant validity were discovered. There were some poorly loaded items in the initial CFA (less than 0.5). Also, some items cross-loaded with other items in the model. Based on this, the four items with factor loadings lower than 0.5 were removed (one biospheric value, one attitude, one subjective norm and one perceived behavioral control). The acceptable model fit using AMOS should have the following results: Likelihood ratio p-value ≥ 0.05; relative value ($\chi 2/df \leq 2$); CMIN/DF (≤ 3); GFI (≥ 0.9); AGFI (≥ 0.9); CFI (≥ .90); RMSEA (≤ 0.05); RMR (≤ 0.05); SRMR (≤ 0.05); CN (≥ 200) [59, 63-65] (Kline, 2005; Tabachnick & Fidell, 2007; West, Taylor, & Wu, 2012). The model is deemed acceptable ($\chi 2$ [639] = 2268.314; x2/df CFI = 0.951, RMSEA = 0.04, SRMR = 0.040, NFI = 0.802, GFI = 0.944, AGFI = 0.801), with the fit indices indicating that the measurement model is a good fit for the data.

Table 1. Measurement model.

Construct (mean and SD)	Factor loading	CA	CR	AVE
Biospheric values (BV) (4.25, 1.03)	0.768 0.824 0.877	0.822	0.864	0.679
Attitude (ATT) (4.08, 0.98)	0.694 0.753 0.799 -	0.836	0.793	0.562
Subjective norms (SN) (2.74, 0.93)	0.821 0.863 0.808	0.900	0.870	0.691
Perceived behavioral control (PBC) (3.65, 1.12)	0.772 0.806 0.749	0.839	0.819	0.602
Environmental self-identity (ESI) (4.05, 1.02)	0.826 0.769 0.808	0.926	0.876	0.632
Personal norms (PN) (4.24, 0.99)	0.808 0.672 0.787	0.864	0.850	0.588
Green entrepreneurial intention (GEI) (3.86, 1.02)	0.842 0.873 0.731 0.829	0.788	0.891	0.673

Table 2. Fornell and Larcker.

Construct	BV	ATT	SN	PBC	ESI	PI	GPI
BV	**0.824**						
ATT	0.339	**0.750**					
SN	0.302	0.408	**0.831**				
PBC	0.262	0.401	0.308	**0.776**			
ESI	0.292	0.405	0.274	0.385	**0.795**		
PI	0.501	0.269	0.445	0.295	0.308	**0.767**	
GEI	0.408	0.333	0.438	0.293	0.308	0.355	**0.820**

Figures in bold in the diagonal depict the square root of the AVE values.

Table 3. HTMT.

Construct	BV	ATT	SN	PBC	ESI	PI	GPI
BV							
ATT	0.477						
SN	0.329	0.196					
PBC	0.582	0.704	0.399				
ESI	0.436	0.662	0.293	0.199			
PI	0.531	0.209	0.475	0.183	0.394		
GEI	0.510	0.373	0.529	0.172	0.528	0.273	

Table 1 shows that the Cronbach's alpha and composite reliability of each construct are greater than 0.70 and 0.50, respectively, indicating good internal consistency. An AVE > 0.50 for each construct suggests an adequate convergent validity. To assess the discriminant validity, the study used both the Fornell–Larcker criterion and the heterotrait-monotrait (HTMT) ratio (see Tables 2 and 3). The results indicate that the square root of the AVE for each construct is greater than the correlation with all other constructs. In addition, the results of the HTMT are lower than 0.95 for all the constructs (Fornell & Larcker, 1981; Henseler, Ringle, & Sarstedt, 2015).

4.3.2. Results of the Structural Model

The relationships between the constructs were tested using latent SEM analysis with maximum likelihood analysis. The direct and indirect effects were tested. First, the structural model achieved an acceptable model fit (($\chi 2$ [532] = 1769.305; $\chi 2$/df = 3.229; CFI = 0.906; RMSEA = 0.047). The R^2 of the TPB model is 0.472, and that of the extended model is 0.594. The results indicate the greater predictive power of the extended model.

Table 4. Structural model results.

Path	*B*	SE	T-value	Decision
H1: BV-ATT	0.204	0.046	7.408*	Accepted
H2: BV-SN	-0.044	0.044	-0.051	Not accepted
H3: BV-PBC	0.502	0.067	4.922**	Accepted
H4: BV-ESI	0.531	0.048	5.449**	Accepted
H5: BV-PN	0.317	0.062	4.665*	Accepted
H6: BV-GEI	0.248	0.039	3.728**	Accepted
H7: ATT-GEI	0.374	0.043	7.952*	Accepted
H8: SN-GEI	0.036	0.049	0.108	Not accepted
H9: PBC-GEI	0.275	0.053	4.008**	Accepted
H10: ESI-GEI	0.327	0.062	6.497*	Accepted
H11: PN-GEI	0.292	0.041	3.622**	Accepted

Note: * P < 0.01; ** < 0.05.

Table 4 presents the results of the structural model for the study hypotheses. The results (B 0.204; T 7.408; Sig < 0.01) indicate a significant positive relationship between biospheric values and attitude; therefore, H1 is accepted. The results (B -0.044; T -0.051; Sig > 0.05) indicate an insignificant relationship between biospheric values and subjective norms; therefore, H2 is rejected. The results (B 0.502; T 4.922; Sig < 0.05) indicate that biospheric values and perceived behavioral control are significantly positively related; therefore, H3 is accepted. The results (B 0.531; T 5.449; Sig < 0.05) indicate a significant positive relationship between biospheric values and environmental self-identity; therefore, H4 is accepted. The results (B 0.317; T 4.665; Sig < 0.01) indicate that biospheric values and personal norms are significantly positively related; therefore, H5 is accepted. The results (B 0.248; T 3.728; Sig < 0.05) indicate a significant positive relationship between biospheric values and GEI; therefore, H6 is accepted. The results (B 0.374; T 3.952; Sig < 0.01) indicate that attitude and GEI are significantly positively related; therefore,

H7 is accepted. The results (B 0.036; T 0.108; Sig > 0.05) indicate an insignificant relationship between subjective norms and GEI; therefore, H8 is rejected. The results (B 0.275; T 4.008; Sig < 0.05) indicate that perceived behavioral control and GEI are significantly positively related; therefore, H9 is accepted. The results (B 0.327; T 6.497; Sig < 0.01) indicate a significant positive relationship between environmental self-identity and GEI; therefore, H10 is accepted. The results (B 0.292; T 3.622; Sig < 0.05) indicate that personal norms and GEI are significantly positively related; therefore, H11 is accepted.

4.3.3. Indirect Effects

The study conducted a mediation or indirect analysis using a bootstrap sample of 5000 to test the mediating effects of attitude, subjective norms, perceived behavioral control, environmental self-identity and personal norms in the relationship between biospheric values and GEI. The model fit is acceptable ($\chi 2$ [618] = 1925.216; x2/df CFI = 0.724 , RMSEA = 0.03; SRMR = 0.041, NFI = 0.809, GFI = 0.958, AGFI = 0.800].

Table 5. Indirect effects.

Path	SE	Lower	Upper	Result
BV-ATT-GEI	0.063*	0.031	0.091	Positive mediation
BV-SN-GEI	-0.011	-0.011	0.052	No mediation
BV-PBC-GEI	0.019	0.013	0.049	No mediation
BV-ESI-GEI	0.072**	0.036	0.097	Positive mediation
BV-PN-GEI	0.045**	0.027	0.088	Positive mediation

Note: * P < 0.01; ** < 0.05.

The results in Table 5 show that three constructs, namely attitude, environmental self-identity and personal norms, indirectly affect the relationship between biospheric values and GEI. The indirect effects of both subjective norms and perceived behavioral control are insignificant.

5. DISCUSSION

The study investigated the role of an extended TPB in predicting the GEI of university students. Three constructs, namely biospheric values, environmental self-identity and personal norms, were used to extend the TPB. The effects of biospheric values on attitude, subjective norms, perceived behavioral control, environmental self-identity and personal norms were examined. In addition, the relationships between biospheric values, attitude, subjective norms, perceived behavioral control, environmental self-identity and personal norms and GEI were explored.

The findings of the study indicate that the effects of biospheric values on attitude, subjective norms, environmental self-identity and personal norms are significantly positive. The results suggest that students with biospheric values are likely to develop a positive attitude and obtain knowledge and information on green entrepreneurship. Also, students with a biospheric value orientation are likely to develop environmental self-identity and personal norms. The findings are consistent with the results of prior empirical studies (Kim & Seock, 2019; Nguyen et al., 2016; Tiwari, 2022; Van Der Werff et al., 2013; Wang et al., 2021) which positively associated biospheric values with attitude, perceived behavioral control, environmental self-identity and personal norms.

The findings also positively linked biospheric values, attitude, perceived behavioral control, environmental self-identity and personal norms to the GEI of university students. The findings suggest that the development of a positive attitude toward green entrepreneurship can positively affect GEI. In addition, knowledge of green entrepreneurship can positively influence GEI. These findings are supported by prior empirical results. Prabowo et al. (2022) found that perceived behavioral control has a positive relationship with the GEI of university students in Indonesia. Ranasinghe and Ajward (2019) and Yasir et al. (2021) found that attitude, subjective norms and perceived behavioral control are positively related to the GEI of university students in Pakistan. The findings also

showed that environmental self-identity and personal norms positively affect the GEI of university students. It was also found that university students who identify themselves as environmentally friendly are likely to develop GEI. In addition, the findings indicate that the moral obligation to do the right thing for the environment is a strong predictor of GEI. These findings are consistent with prior empirical results. Studies by Van Der Werff et al. (2013); Carfora et al. (2017) and Qasim et al. (2019) found a significant positive relationship between environmental self-identity and intention in different contexts of pro-environmental behavior. In addition, Onel (2017); Sarmento and Loureiro (2021) and D'Arco et al. (2023) found that personal norms and pro-environmental intention are positively related. Ates (2020) pointed out that the indirect effects of TPB constructs are a new line of enquiry in pro-environmental research as this helps to determine the intervening power of these constructs. The findings of the study show that attitude, environmental self-identity, and personal norms mediate the relationship between biospheric values and GEI, and the three constructs are mechanisms through which biospheric values can affect the GEI of university students.

6. CONCLUSION

6.1. Theoretical Contribution

The findings confirm the applicability of an extended TPB model that includes biospheric values, environmental self-identity and personal norms to predict the GEI of university students. The study's novelty is a new theoretical model that links values, identity and personal norms in explaining the GEI of university students.

6.2. Policy Contribution

Based on the findings of the study, it is important to strengthen biospheric values, attitude, perceived behavioral control, environmental self-identity, and personal norms of university students in order to improve their green entrepreneurial intention. To improve attitude and perceived behavior control, universities should include entrepreneurship and environmental education as compulsory subjects in all undergraduate programmes. Entrepreneurship competitions at the university level should focus on green entrepreneurship. University centers that support entrepreneurship should provide financial and non-financial support for students to start green businesses. Government financial support for students who want to start green businesses will also help to improve attitude. Therefore, both university entrepreneurial support and external institutional support to assist students in the creation of green businesses should be enhanced. Universities, media and governments should continue to create awareness of ecological challenges to help students to develop a sense of responsibility toward the environment and improve biospheric values.

6.3. Limitations and Areas for Further Study

Data was collected from students at only two South African universities, which affects the generalizability of the findings. Therefore, the inclusion of students from other universities locally and internationally will help to improve the generalizability of the empirical findings. The study used a cross-sectional survey method, and a longitudinal study can help to confirm cause and effect. The study only focused on Business Management students, so including students from non-business departments will also help to generalize the findings. The study did not include moderating variables; therefore, other studies can include moderating factors, such as entrepreneurship education and environmental awareness, to better understand the factors that can intervene in the observed relationships. Finally, the study focused on biospheric values, so future studies could focus on how altruistic and egoistic values can affect the GEI of university students.

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Institutional Review Board Statement: The Ethical Committee of the University of Limpopo, South Africa has granted approval for this study on 5 March 2022 (Ref. No. TREC/08/2022).
Transparency: The author states that the manuscript is honest, truthful, and transparent, that no key aspects of the investigation have been omitted, and that any differences from the study as planned have been clarified. This study followed all writing ethics.
Competing Interests: The author declares that there are no conflicts of interests regarding the publication of this paper.

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Appendix 1. Measures of the constructs of the study.

Construct	Items	Adapted from	Response options
Biospheric values	1. Preventing pollution, protecting natural resources. 2. Respecting the earth, harmony with other species. 3. Unity with nature, fitting into nature. 4. Protecting the environment, preserving nature.	De Groot and Steg (2007)	1 = Not at all important, 5 = Very important
Attitude toward green entrepreneurship	For me, starting a green business is: 1. Good 2. Desirable 3. Pleasant 4. Wise	Ates (2020)	1 = Strongly disagree, 5 = Strongly agree
Subjective norms	1. My family members think that I should pursue a green entrepreneurial career. 2. My closest friends think that I should pursue a green entrepreneurial career. 3. People who are important to me think that I should pursue a green entrepreneurial career. 4. My co-students think that I should pursue a green entrepreneurial career.	Van Der Werff and Steg (2016)	1 = Strongly disagree, 5 = Strongly agree
Perceived behavioral control	1. Whether I pursue a green entrepreneurial career is entirely up to me. 2. I am confident that if I want, I can pursue a green entrepreneurial career. 3. I have the knowledge to pursue a green entrepreneurial career. 4. I have the skills to pursue a green entrepreneurial career.	Ates (2020)	1 = Strongly disagree, 5 = Strongly agree
Environmental self-identity	1. Acting environmentally friendly is an important part of who I am. 2. I am the type of person who acts environmentally friendly. 3. I see myself as an environmentally friendly person.	Van Der Werff et al. (2013)	1 = Strongly disagree, 5 = Strongly agree
Personal norms	1. I feel that I am morally obligated to start a green business.	Onel (2017)	1 = Strongly disagree, 5 = Strongly agree

	2. I would be a better person if I started a green business. 3. When I want to start a business, I will feel morally obligated to prioritize a green business over a conventional business.		
Green entrepreneurial intention	1. I have an interest in green entrepreneurship. 2. I plan to be a green entrepreneur. 3. I will put my best effort into starting my own green enterprise. 4. It is my goal to start a green business in the future.	Wang et al. (2021)	1 = Strongly disagree, 5 = Strongly agree